ANGLIA RUSKIN UNIVERSITY

THE OPTIMISATION OF CONSTRUCTION MANAGEMENT HIGHER EDUCATION TO PROMOTE PROFESSIONAL COMPETENCIES AND PROFESSIONAL CAPABILITY

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A thesis in partial fulfilment of the requirements of Anglia Ruskin University for the Professional Doctorate in the Built Environment

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ANGLIA RUSKIN UNIVERSITY

ABSTRACT

FACULTY OF SCIENCE AND TECHNOLOGY
PROFESSIONAL DOCTORATE (BUILT ENVIRONMENT)

THE OPTIMISATION OF CONSTRUCTION MANAGEMENT HIGHER EDUCATION TO PROMOTE PROFESSIONAL COMPETENCIES AND PROFESSIONAL CAPABILITY

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Government and higher education see the employability of graduates as a priority. Anecdotal and empirical evidence from the researchers own fully accredited institution suggests there is little structure to the delivery of Personal Development Planning (PDP); it is not related to the world of work and of limited relevance to the learning that takes place. A critical review of published literature has revealed that an understanding of the links between PDP and work-based learning (WBL) could provide routes to improving professional membership. The thesis resolves this gap in knowledge enabling HE practitioners to enhance the development of skills and competencies.

The research is mainly set in a positivistic paradigm with mixed methods research following a survey based methodological approach. Data collected through questionnaires, structured interviews and focus groups, are used to analyse the opinions and beliefs of staff and students in HE and experienced professionals working at the cutting edge of the construction industry.

The work identifies the skills and competencies needed for academic study and employability, with PDP seen as an essential element of an academic course. Reflective practice is key to learning new knowledge and skills in the workplace and empirical investigation suggests experience plays a significant part in the learning process. All students should have an opportunity to see the application of theory with practice through WBL.

The research has contributed to the body of knowledge by challenging the inadequacies in existing practice. The thesis identifies the key components and linkages in a theoretically informed model that proposes the use of a Graduate Skills Framework for Construction Management. This new-found understanding and toolkit promotes the teaching of employability skills alongside PDP in a structured programme of WBL. Research participants agree that this is expected to support the development of professional competencies and enhanced capability for the benefit of students, professionals and the construction industry.

Key words: personal development planning, work-based learning, professional competence, competencies, capability, skill development.

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Abbreviations and Acronyms

APEL	Accredited Prior Experimental Learning
ARU	Anglia Ruskin University
BERA	British Educational Research Association
CBI	Confederation of British Industry
CIAT	Chartered Institute of Architectural Technology
CIC	Construction Industry Council
CIHE	Council for Industry and Higher Education
CIOB	Chartered Institute of Building
COBE	Centre for Outcomes Based Education
CPD	Continuing Professional Development
CSF	Course Specification Form
DfES	Department for Education and Sciences
FREP	Faculty Research Ethics Panel
GCLO	Graduate Common Learning Outcomes
HE	Higher Education
HEA	Higher Education Academy
HEFCE	Higher Education Funding Council for England
ICE	Institution of Civil Engineers
ICLO	Intermediate Common Learning Outcomes
ICT	Information and Communication Technology
JBM	Joint Board of Moderators
KIS	Key Information Sets
MACOS	Man: A Course of Study
MCIOB	Member of the Chartered Institute of Building
MDF	Module Definition Form
MEQ	Module Evaluation Questionnaire
MICE	Member of the Institution of Civil Engineers
NOS	National Occupational Standards
NSS	National Student Survey
NVQ	National Vocational Qualifications
QAA	Quality Assurance Agency

QCF	Qualifications Credit Framework
RIBA	Royal Institute of British Architects
RICS	Royal Institution of Chartered Surveyors
SCQF	Scottish Credit and Qualifications Framework
SES	Student Experience Survey
SMT	Senior Management Team
SPSS	Statistical Package for Social Sciences
UCAS	Universities and Colleges Admissions Service
VLE	Virtual Learning Environment
WBL	Work Based Learning
ZPD	Zone of Proximal Development

Copyright Declaration

1.0 Introduction to the Research

1.1 Introduction to the chapter

This chapter sets the scene and context for the research. It provides an account of why this research is relevant and how my experiences of academic study and industrial reality in professional practice influence the thinking and passion shown for the research topic. The chapter identifies the issues that exist within built environment courses at Anglia Ruskin University, with the focus on the degree course in construction management. Evidence from Anglia Ruskin University (Pilot study of construction management students and Module Evaluation Questionnaires) suggests there are problems associated with Personal Development Planning (PDP) delivery and work-based learning (WBL) activity with no link at department level between PDP and WBL modules. Students do not appear to have the appropriate study skills to work as independent learners as evidenced by staff feedback at the university. Research has revealed a plethora of literature on PDP, WBL and professional competence but little evidence linking the three areas together into one study.

If the findings in the Department of Engineering and the Built Environment at Anglia Ruskin University are indicative across higher education, then there is a gap in knowledge linking PDP, WBL and the development of professional competencies and capability. The research will explore the perceived gap in knowledge and the theoretical links between training and professional success and develop a conceptual model to rationalise these complex phenomena relating to education and professionalism.

1.2 Setting the scene and why this research project is relevant to me

I have always cared passionately about the construction industry and vocationally orientated academic education. I chose this topic because my research interests lie in the concept of ensuring greater collaboration between academia and industry, utilising work-based evidence towards an academic qualification and preparing students for work which leads to professional recognition.

During my formative years I found the application of theory in a vocational setting stimulating and relevant to a career. This view is shared by Young (1984, p.14) who states that 'Education should be a balance between the vocational and the academic, between the theoretical and the pragmatic, between knowing how and knowing what'. From my experience of university there was limited interaction between the teacher and learner with little opportunity for question and answer. The practical aspects of knowledge were limited and tutors appeared to teach what they wanted based on their own areas of research rather than what students appeared to need or wanted to learn. The course was definitely not related to the world of work but on reflection I acquired the academic skills to be able to think critically, analyse situations and present with reasoned argument my thoughts, ideas and those of experts in the field. This only became apparent after I had been working for several years and could see the benefit of an academic education.

Working for a construction company gave me the opportunity to put theory into practice. I had the theoretical knowledge but now needed to apply it. Although I had studied civil engineering at university I was only using a small percentage of my university education. My experience led me to wonder the extent to which WBL could contribute to an academic built environment qualification. A greater interaction between practice and theory would have brought the classroom to life and prepared me for my role in industry.

Following my time in industry I decided to investigate the world of lecturing in further education. I was able to relate practice to academic theory. This has similarities with views expressed by Taylor (2009, p.16) and how her own levels of effectiveness were increased when theory was applied to practical situations. The tacit knowledge gained from my experience was a key driver in my success. As Gibbons *et al*. (1994, p. 24) state 'Tacit knowledge, by contrast, is not available as a text and may conventionally be regarded as residing in the heads of those working on a particular transformation process, or to be embedded in a particular organizational context.'

After lecturing in a college for several years I became a Senior Lecturer at Anglia Ruskin University in the Department of Engineering and the Built Environment. I was working solely in higher education and had become an academic member of staff. My career had gone full circle but this new role gave me the opportunity to develop my research interests. With my expertise of National Vocational Qualifications (NVQs) and the recognition that work related evidence has alongside theoretical and tacit knowledge I was ready to undertake my greatest challenge yet. The problem identified in Section 1.3 below provides the ideal opportunity to engage in research with the main themes being related to WBL, PDP and professional competence.

1.3 Purpose of the research

1.3.1 The Problem

Government and higher education see the employability of graduates as a priority (ARU, 2011a; CBI, 2011; Leitch, 2006; Lambert, 2003; Dearing, 1997). The whole curriculum in the Department of Engineering and the Built Environment at Anglia Ruskin University is failing to fully capture the skills and competencies needed for employability and subsequent professional responsibility. In 2010, anecdotal evidence from the department's built environment students following a personal tutorial with the author, suggested

that the two PDP modules ‘Contextual Skills for the Built Environment’ and ‘Learning and Practical Skills Development (HE and Work)’ were not relevant to their needs. The intention of these two first year modules is for ‘students to gain an appreciation of Information and Communication Technology (ICT) skills for research, information management and presentation purposes and be encouraged to use contemporary ICT methods for research and for the production and presentation of reports, in a style suitable both for university coursework requirements and in a commercial environment’ (ARU, 2014). The content should enable students to develop their study skills in order to support these modules and their continuing studies. Unfortunately, the two modules were not preparing students for further study, as they appeared not learn anything new during their studies.

The results of the pilot study (carried out by the Researcher) of second year construction management students at Anglia Ruskin University suggests that PDP in the Department of Engineering and the Built Environment has little structure to the delivery, is not related to the world of work and limited relevant learning takes place. PDP is taught in isolation from the rest of the course. There is no common thread in construction management that students can relate to and see the relevance of the PDP sessions. They struggle to link personal learning in one module to professional learning in other future modules.

Edwards (2005) highlights the importance of PDP and how it can be used to meet employer needs and be related to the world of work, but Corkill (2006) suggests that only 25% of work-based foundation degrees have PDP embedded in the curriculum. There is limited research into the provision and efficacy of professional development training for undergraduates. Much has been written on the importance of professional development programs for professionals engaged in practice (Lauer et al., 2014; Tienken and Stonaker, 2007; Jasper, 2006) but little on why undergraduate students would benefit from professional development at University. Students should undertake professional development activities, which allow them to become ‘a safe and competent practitioner who has sufficient knowledge and skills to be fit for the

purpose for which they are employed' (Jasper, 2006, p.27). It is important to instill in students, not only the basic skills but also the higher-level skills needed for academic study and employment. Professional development at university needs to ensure students become more competent; they grow professionally and through learning new knowledge are able to change their beliefs and practices (Lauer et al., 2014).

UK graduates on accredited degree courses who wish to progress to Chartered Membership of the Chartered Institute of Building (CIOB) can do so via the CIOB Professional Development Programme which is aimed at taking a student's academic qualification and through experience, converting it over time to professional membership. According to the CIOB (2010) 'It is a structured and assessed route to membership that focuses on developing and assessing management competence'. Graduates have to prove their competence in a range of areas, which can apply to many different roles within the construction industry. The CIOB Professional Development Programme also allows the graduate to identify development opportunities, which can enhance further career development. Once a graduate has completed the CIOB Professional Development Programme, which takes between two and three years, they are automatically eligible for the Professional Review, which leads to Chartered Membership. The CIOB Professional Development Programme is intended to speed up the route for Graduates to professional membership but this is not always the case as indicated below.

In October 2010, Mills (2010) informed the CIOB Graduate Diploma and Professional Development Programme Committee that a review of the CIOB Professional Development Programme had been carried out. The aim of the review, which has relevance to this research, is to:

- Investigate the reasons why graduates do not join the CIOB Professional Development Programme.
- Reduce the drop out rate and increase numbers coming forward to Professional Review.

Of the questionnaires (1236) sent to Incorporated members of CIOB, 84% of respondents have come from an accredited course such as a BSc (Hons) in Construction Management and 80% of those students are aware of the CIOB Professional Development Programme. In total only 30% of eligible graduates from an accredited course chose the CIOB Professional Development Programme as a route to Chartered Membership. The progression from accredited courses to the CIOB Professional Development Programme appears low. The evidence from CIOB (2013), Quality Assurance Agency (QAA) (2008) and Edwards (2009) on the skills and competencies required of a construction manager will be examined and tested by seeking the views of experienced professionals (higher-level personnel) working at the cutting edge of the construction industry.

Work-based modules are part of the curriculum in Department of Engineering and the Built Environment at Anglia Ruskin University. Unfortunately, they are not as successful as they should be. Only a limited number of students (40% in 2012/13) take these optional modules with the Module Evaluation Questionnaire (MEQ) indicating a 57% (2012/13) satisfaction score and student feedback highlighting the lack of relevance, purpose and point to their course of study. These comments and views will be explored further in the thesis.

Figure 1.1 provides an illustration to help the reader identify the location of the issues and how this thesis perceives these as resultant problems.

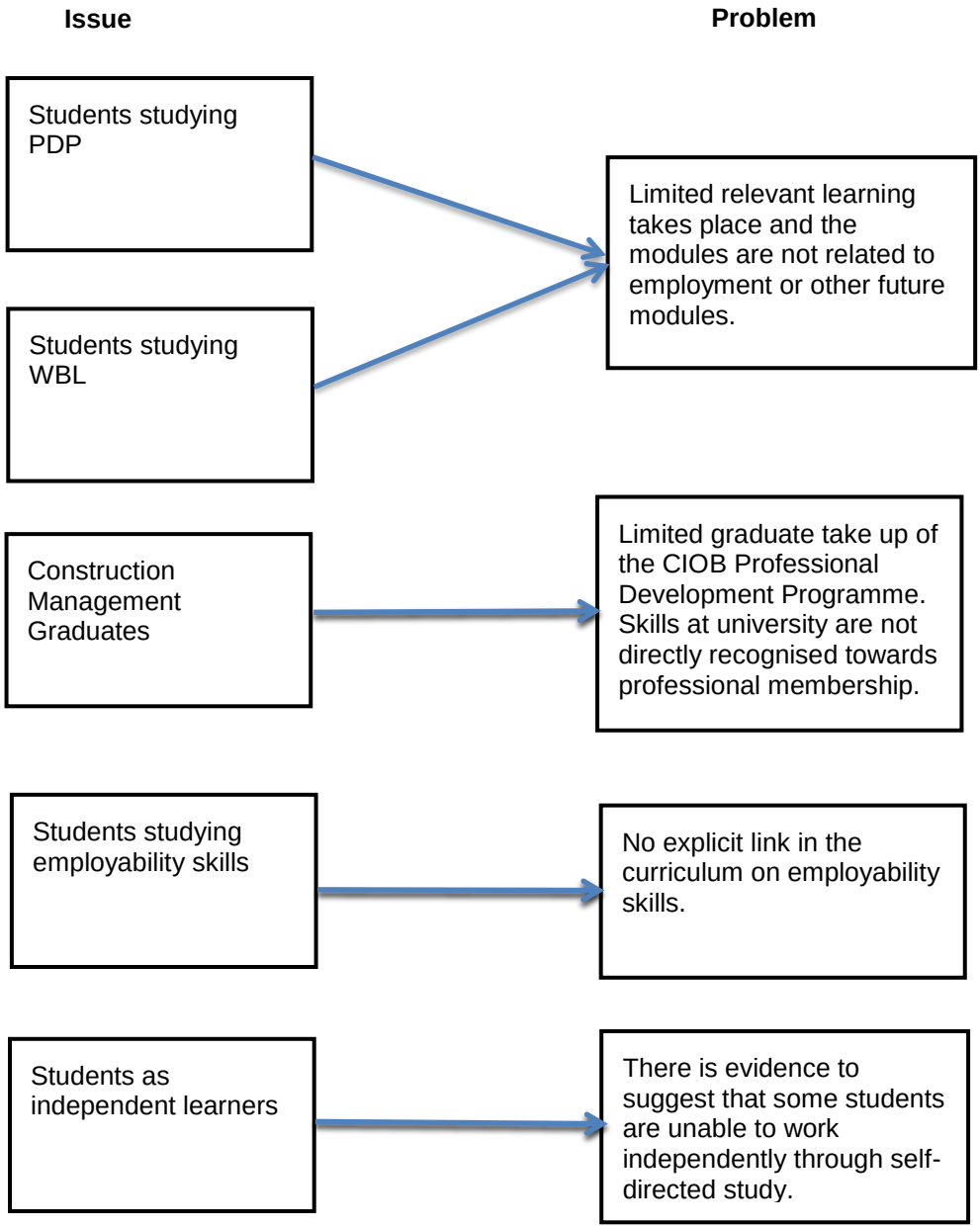


Figure 1.1: The inter-relationship between the issues and problems

If the evidence outlined in Figure 1.1 above is true, there are indications of deficiencies in the built environment curriculum, especially accredited construction management courses at Anglia Ruskin University. The experience suggests there is limited engagement with industry, modules are taught in isolation, students do not always have the appropriate study skills to work as an independent learner and only a limited number of students take the WBL optional modules. Currently, there is no link at department level between PDP and WBL modules and no explicit emphasis in the curriculum on employability

leading to professional competence and responsibility. If the Anglia Ruskin experience on accredited courses is indicative of national trends, the lack of an embedded programme of PDP and WBL may be failing to provide support to students to enable them to fully capture the skills necessary for competent performance, which can lead to professional membership.

1.3.2 The gap in knowledge

There have been previous studies on PDP (Clegg and Bradley, 2006; Corkill, 2006; Edwards, 2005; Whitlock, 2005), WBL (Margaryan, 2008; Bould and Solomon, 2001; Raelin, 1997) and professional competence and responsibility (Van der Vleuten et al., 2010; Govaerts, 2008; Solbrekke and Karseth, 2006; Cheetham, 1999). If the experience in the Department of Engineering and the Built Environment at Anglia Ruskin University is typical across higher education, then students may not be adequately being prepared for their professional role. This research will explore whether PDP and WBL can contribute to professional competencies and capability.

Edwards (2005, p.7) identifies that 'PDP should highlight and include activities that emphasise the longer term benefits in relation to life skills for career management and professional accountability' but the experience in the Department of Engineering and the Built Environment at Anglia Ruskin University does not currently support this process. Corkill (2006, p.32) believes that PDP sits 'very easily both as preparatory to and complementary with WBL' yet as Corkill indicates, no nationwide piece of research has, to date, been completed in this area.

Clegg and Bradley (2006) identify three different models of personal development practice: professional, employment and academic, which categorise the activity and skill development taking place. Whitlock (2005) feels that PDP should be broken down into modular components of curriculum, specific PDP sessions and the development of a portfolio. If PDP is to link with WBL then the characteristics of a WBL curriculum identified by Margaryan

(2008) and Bould and Solomon (2001) need to be further investigated in the context of the WBL model of Raelin (1997) and the models of PDP proposed by Clegg and Bradley (2006) and Whitlock (2005).

The study by Solbrekke and Karseth (2006) identifies that Swedish undergraduate students on professional courses wish to be educated in ethical and moral dimensions of professional responsibility however there is little coverage of these areas on courses in the Department of Engineering and the Built Environment at Anglia Ruskin University. Cheetham and Chivers (1998) revised model of professional competence highlights the importance of reflection and how it provides feedback both during and after an activity but can these reflective practices really enhance professional capability? This will be explored further in the thesis and at the author's own institution.

The proposed research aims to explore the gap in knowledge which surrounds current practice related to PDP and WBL. It aims to define mechanisms to optimise the achievement of professional competencies and capability through higher education. There is considerable work written on how students learn (Jordan, Carlisle and Stack, 2008; Bailey, Hughes and Moore, 2004; Kolb, 1984; Schön, 1983) and how they apply the knowledge learnt (Cheetham and Chivers, 2001; Gibbons et al., 1994; Eraut, 1994; Bloom et al., 1956) but little on the importance of PDP and professional skill development in tandem with WBL. This research will explore this gap in knowledge and identify the theoretical links between training and professional success in order to develop a conceptual model, which rationalise these complex phenomena relating to education and professionalism.

1.4 Evidence from current practice within Anglia Ruskin University

In November 2010, a pilot study of second year construction management students at Anglia Ruskin University who studied either of the modules 'Contextual Skills for the Built Environment' or 'Learning and Practical Skills Development (HE and Work)' the previous year was carried out using a survey based questionnaire. The aim of the pilot study was to collect data through a series of closed questions in order to explore the anecdotal evidence from students who had studied PDP modules. The study achieved a response rate of 56% (26 out of 46) with 65% of respondents revealing that they had studied PDP the previous academic year. Those students were then asked to indicate which topics from a list of 17 they covered during the PDP sessions in their first year. The list was selected by identifying key words/phrases on the Module Definition Forms (MDFs) for the two modules identified above and then compiling suitable topics from the information. Figure 1.2 identifies the results of the question.

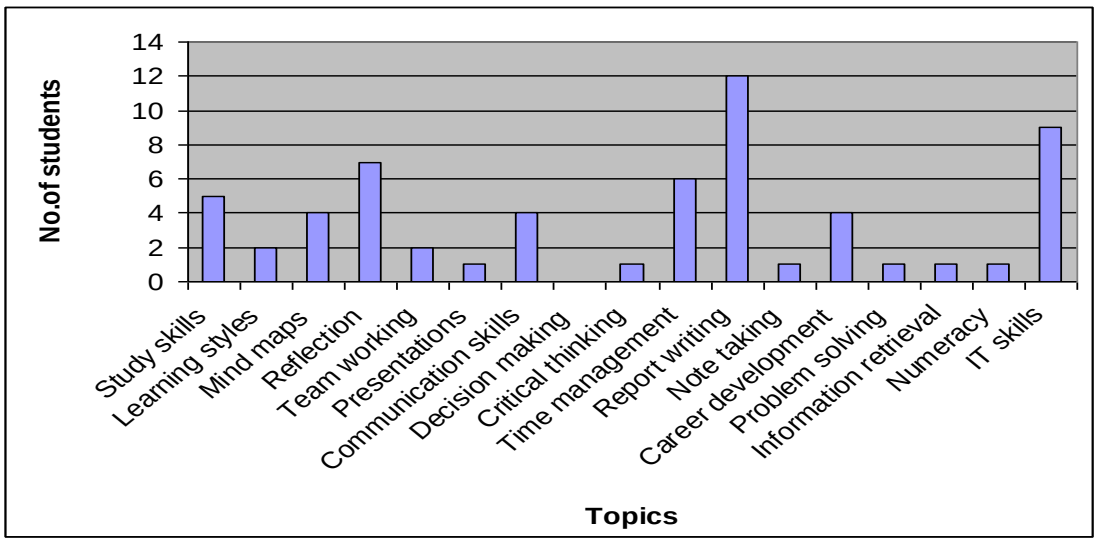


Figure 1.2: Topics covered during the PDP sessions

Construction management students identify report writing and IT skills as the areas of PDP, which have been covered more than any other. According to the

student responses decision-making techniques are not covered during the sessions. Of the construction management students who have studied PDP before, 59% reported they did not learn anything new during the sessions and 47% considered that the delivery of PDP does not have any structure. 71% of construction management students would like to see PDP taught differently and 82% of students do not consider they cover PDP again on their course. They do not make any link between PDP at level 4 of their studies in the modules 'Contextual Skills for the Built Environment' or 'Learning and Practical Skills Development (HE and Work)' and the level 6 module 'Major Project'. Through this thesis these comments will be explored further and will aim to identify a best practice model for the delivery of PDP, WBL and professional skill development to enhance traditional academic theory at Anglia Ruskin University.

1.5 Aim and objectives

The sources of inspiration behind the research identified in the previous sections of this chapter have enabled the research aim and objectives to be established. The aim of the research is to:

> ***Explore the extent to which the potential academic processes of PDP and WBL, as part of an undergraduate degree, can enhance achievement of professional competencies and capability.***

The research involves undergraduate students from Built Environment courses at Anglia Ruskin University, pathway leaders at UK universities offering a BSc Construction Management course and experienced professionals (higher-level personnel) working at the cutting edge of the construction industry.

The research will focus on the following objectives:

1. Identify what is included in the process of learning and how students might apply knowledge in both an academic and workplace setting.

2. Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.

3. Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work.

4. Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.

5. Propose an integrated model of PDP and WBL to enhance traditional academic theory.

The evidence of professional shortcomings exist despite the accredited courses in the Department of Engineering and the Built Environment at Anglia Ruskin University meeting the requirements of the QAA (2012a) Quality Code, the QAA (2008) Subject Benchmark Statements for construction management courses and the CIOB (2013a) Education Framework. Within the curriculum at Anglia Ruskin University, skills and competences are not formally identified and made explicit for all built environment students. There is no 'road map' included in course documentation such as the Student Handbook. Only those students that study WBL modules will undertake a skills analysis (personal, professional and project) and identify 12 competencies that they have satisfied during their WBL experience. The research will explore how this can be improved and implemented for all construction management students.

1.6 Chapter summary

The aim of this chapter has been to set the scene and context for the research by identifying the issues and associated problems with the built environment curriculum at Anglia Ruskin University, especially within the construction management field.

The chapter provides an account of why this research is important and how this has influenced the research topic. The chapter identifies how greater collaboration between academia and industry could be the basis of an integrated model of PDP, WBL and professional competencies in order to enhance/accelerate the achievement of professional competence.

The chapter goes on to identify from anecdotal evidence, verified through a pilot study of second year construction management students at Anglia Ruskin University, the problems encountered with an unstructured personal development programme. The evidence suggests there is little structure to the delivery of the modules 'Contextual Skills for the Built Environment' or 'Learning and Practical Skills Development (HE and Work)' because they are not related to the world of work and limited learning takes place. There is no link at Department level at Anglia Ruskin University between PDP and WBL modules, and employability skills and professional competence is not explicitly covered in the curriculum.

The experience in the Department of Engineering and the Built Environment at Anglia Ruskin University with PDP, WBL and professional skill development may be typical across higher education. If this is the case, then the students may not be adequately prepared for working in a professional environment. The research aims to explore the gap in knowledge, which surrounds current practice related to PDP and WBL and the development of professional competencies and capability. Finally, the chapter provides a framework through which the research aim and objectives will be answered.

2.0 Professional Competence

2.1 Introduction to the chapter

The purpose of this chapter is to establish from published literature the nature and place of professional competence in the context of the research project. This will be analysed by considering the criteria against which a professional can be judged. The role of the professional body is outlined and those professional bodies in the built environment with a Royal Charter are identified.

The chapter goes on to critically appraise four models of professional competence and skill acquisition. The work of Cheetham and Chivers (1996, 1998), Miller (1990), Dreyfus and Dreyfus (1980) and Pavalko (1971), will be considered in the context of achievement of professional knowledge, competence and expertise.

The chapter moves to consider the skills and competencies needed for construction management which are identified using the National Occupational Standards, the CIOB (2013a) Education Framework and evidence from the four foundation degree projects using the work carried out by Edwards (2009). Finally, the chapter concludes with a discussion on formal and informal learning and how this may be recognised in construction management at Anglia Ruskin University.

The chapter will inform the range of questions given to higher-level personnel in the construction industry. Higher-level personnel will be asked for their opinion on the role of the professional, models of professional competence and the skills and competencies for built environment students. The responses will inform the development of the integrated model of PDP and WBL.

2.2 What is a profession?

2.2.1 Introduction

The Oxford English Dictionary defines 'profession' as a 'vocation or calling, one that involves some bunch of advanced learning or science'. Lester (2009, p.2) sees it as being a 'well-defined occupation that meets a defensible set of criteria'. Cheetham and Chivers (2000) in their work on competent professional practice feel there is considerable disagreement on the use of the term 'profession'. Cheetham and Chivers (2000) modified the work of Carr-Saunders (1928) and provided the following definition for use in their research:

> '… an occupation based upon specialised study, training or experience, the purpose of which is to apply skilled service or advice to others, or to provide technical, managerial or administrative services to, or within, organisations in return for a fee or salary.'
>
> (Cheetham and Chivers, 2000, p.375).

Dyer (1985, p.72) provides a far more cynical view and defines it as 'getting paid for what others do for free'. The term 'profession' has been around since the start of the 18th century but started to gain momentum and recognition during the industrial revolution. Advances in science saw an increase in research and applied knowledge, through workplace activities, which resulted in further learning for both existing professionals and those not previously thought of as being a professional (Bilodeau, 2004, p.1). Roberts (2009) in her role as Policy and Ambassador Development Manager for the CIOB, presented a paper that identified through the 20th century, the emergence of new professionals. These new breed of professionals worked for organisations within the commercial sector where the distinction between 'trade' and 'profession' became increasingly blurred (Roberts, 2009, p.3).

Boone (2001) believes that the professional must possess 'specific skills' in order to provide a service to the public. These skills are obtained through scholarly activity. Pavalko (1971, p.16) has a similar view and believes that a professional's work involves considerable amounts of knowledge and skills.

The traditionalist view is that professionals are seen as experts in their field and as such only they can determine the real needs of the client (Eraut, 1994). This view now appears out-dated as identified by the following comment from Eraut (1994, p.5) who points out 'The concept of "clients rights" has increasingly gained acceptance so that the identification of need is beginning to become a joint venture'.

The Institute for Learning (2009, p.3) argues that the term 'professional' can be misinterpreted. On the one hand it can be asking whether the individual is a member of a professional body. On the other hand it can be seeking a view as to whether the individual is 'worthy of professional status by reason of how well something is carried out, doing a job in an appropriately professional manner' (Institute for Learning, 2009, p.3). Of course, how a person views their job or what they think the public perception of it will be, will influence their response.

Cheetham (1999) identifies six ways of defining professions. The first three, attributed to Millerson (1973, cited in Cheetham 1999, p.13) are:

i. 'using a set of characteristics or traits associated with professions;
ii. looking for evidence of professionalization – the process through which occupations become professions; and
iii. developing a model of professionalism based on certain sociological aspects of professional practice.'

The list of traits exhibited by professionals as identified by Millerson (1964) has been criticised by Eraut (1994). It does not provide a useful definition of a professional because the author's view only takes into account the most prominent traits of certain types of professionals (Eraut, 1994, p.1). Is it possible for one list to cover all professions? Are certain traits only applicable to one group of professionals? The skills and competencies needed by a professional will be explored through the structured interviews to higher-level personnel.

Cheetham (1999, p.13) provides three further methods for identifying professions, which could be added to Millerson's list. They are:

iv. ‘adopting a rational classification system based on socio-economic factors – e.g. Standard Occupational Classifications;
v. examining the complexity of competencies involved (which may have some relationship to an NVQ level); and
vi. following the societal view of which jobs are professions.’

The Institute for Learning (2009, p.2) see competence and skill as the key characteristics of a professional. Stebbins (1992, p.23) provides further clarification by identifying the attributes, which are common to the role of a professional and those in professional practice:

- ‘Professionals turn out unstandardized products and services
- Professionals are well versed in an expulsive body of theoretical knowledge and, at times, technique.
- Professionals share a strong sense of identity with their colleagues, from whom they develop a sense of community, a sense of being members of an in-group.
- Professions master a general cultural tradition associated with their line of work.
- Professions use institutionalized means of formally or consensually validating the adequacy of training and the competency of trained individuals.
- Professional work constitutes a calling, which the primary concerns are consistent application of a standard and provision of a service or product, and the actual monetary return is secondary to the work itself.
- Professionals are recognized by their clients or publics for their special authority, based on knowledge, experience, in some cases, technique.
- Professional services and products provide an avenue for attainment of certain important social values.
- Professional work is self-regulated and autonomous’

Stebbins (1992, p.23)

Bilodeau (2004, p.4) feels that the list is all-encompassing and gives a useful overview on professional activity, however Bilodeau believes the attributes do not relate to specific types of work and as such for a type of work to be considered professional, all of the attributes need to be present. This will be

explored further through the use of structured interviews with higher-level personnel in the construction industry.

This occupational group of professionals has ill-defined boundaries, but an 'ideal type' of professional such as those in law and medicine may exist (Eraut, 1994). Whatever, the definition of 'profession', the literature (Eraut, 1994; Stebbins, 1992) suggests that the individual professional should be competent and act in an ethical way, however should the professional put the client first and also act in the best interest of society as a whole? It is important that the research identifies how a professional should behave and how society expects a professional to act since this has a bearing on the skills and competencies needed to be a professional. The definition adopted by the researcher for this thesis is '*Professionals are recognized by their clients or publics for their special authority, based on knowledge, experience, in some cases, technique' (Stebbins, 1992, p.23).* The skills and competencies will be explored further though the use of structured interviews with higher-level personnel in the construction industry.

2.2.2 The professional body

The role of professional bodies and their engagement with higher education is part of the Government's social mobility agenda. According to the Higher Education Better Regulation Group (2011, p.8) 'Some bodies have a prescribed statutory or regulatory responsibility to accredit higher educational programmes and determine standards' and those that are 'incorporated by Royal Charter are regulated under the auspices of the Privy Council. These bodies normally work in the public interest and demonstrate eminence, stability and permanence in their particular field.'

According to the Chartered Quality Institute (2011) the main focus of a professional body is to provide support for its members and to promote the organisation to the wider general public. This view is shared by Bilodeau (2004, p.6) with the notion that professional bodies encourage the enhancement of

knowledge, however the term ‘professional’ has been diluted. Only a handful of professional bodies are allowed by law to stop non-professionals from practicing. This raises an important question; should all professionals be required to have an academic qualification, e.g. a degree and/or a professional qualification in order to practice as a professional? In nursing for example, the move has been to graduate level entry to ensure a level of academic achievement appropriate to the changing face of nursing. This concept will be discussed later in the thesis and through the structured interviews with higher-level personnel.

In the built environment sector, there are a number of professional bodies with Royal Charters. Table 2.1 provides an example of a professional body with a Royal Charter and Appendix 2.1 provides a useful summary of other more prominent professional bodies in the built environment. The main points (key themes) identified from these professional bodies are promotion of its activities, support for its members and the ethical dimension of upholding societies’ values from education through to development and construction.

Table 2.1: An example of a professional body in the built environment sector with a Royal Charter

Professional Body	Statement
Chartered Institute of Building (CIOB)	Granted a Royal Charter in 1980 and its objectives, as defined in its Royal Charter, are: • The promotion for the public benefit of the science and practice of building. • The advancement of public education in the said science and practice including all necessary research and the publication of the results of all such research. These objectives form the foundations of the Institute's work, its role, and sets the standards to which members are committed. *CIOB (2012a)*

The Higher Education Better Regulation Group (2011, p.8) draws a distinction between professional bodies and regulatory bodies. Professional bodies are set up to promote and support members belonging to that organisation. They are self-regulating and have their own code of professional standards. These differ from a regulating body which is set up by Government to act in the interests of society therefore regulating how individuals behaviour and/or operate. In Architecture, for example which is regulated by statute, only graduates who have been through accredited education/training are able to practice as a Chartered Architect. This emphasises the importance of accreditation, through which professional standards and competence should be maintained.

2.3 What is professional competence?

The Oxford English Dictionary defines competence as 'ability; the state of being competent' and competent as 'adequately qualified or capable'. Cheetham (1999) feels the term 'competence' can mean different things depending on how it is used. Eraut (1994, p.166) explains that, it can have ' … the positive meaning of "getting the job done" or the negative meaning of "adequate but less than excellent"'. Trinder (2008, p.165) sees competency as 'the ability to apply knowledge and skills to produce a required outcome.' Govaerts (2008, p.235) identifies competency (or competence) as 'the (individual) ability to make deliberate choices from a repertoire of behaviours for handling situations and tasks in specific contexts of professional practice, by using and integrating knowledge, skills, judgements, attitudes and personal values, in accordance with professional role and responsibilities.' This definition suggests professionals must be capable of making decisions; they must be able to function in a variety of situations and be able to undertake a range of tasks.

Epstein and Hundert (2002, p.226) provide the following definition of professional competence related to medical schools and postgraduate training programmes. It is 'the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and the community being served.' The definition links the words 'professional' and 'competence' together in a useful way. In providing a service or benefit to society, professionals should have the knowledge and ability to uphold professional standards in their daily activity. To do this, maintaining a code of ethics and reflective practices is seen as essential in performing as a professional in a competent way.

There are two perspectives when defining competence (Robotham, 2003, p.475). One perspective deals with the 'behaviour of a particular individual' and how they 'act and respond in the organisational environment in the course of doing their job' (ibid). The other perspective identifies 'competencies not as

aspects of a given job, but as identifiable characteristics of the people who do the job effectively' (ibid). This suggests that the extent to which a task is achieved is dependent on the ability of the person carrying out the task.

Kirschner and Van Vilsteren (1997, p.1) see competence as a mixture of knowledge and skills, which enable the individual to carry out a range of activities. At university students acquire the skills and knowledge through situational learning environments, which try and replicate the workplace. This concept should enable students to apply what they have learnt in the classroom where knowledge is context-dependent to the world of work and the professional setting (ibid).

Eraut (1994, p.163) summaries from the work of Carr-Saunders and Wilson (1933) that 'gentlemen' of that era, associated the term 'properly qualified' with having intellectual ability, rather than practical skills. Having a professional qualification was seen as all-important rather than the ability to do the job. This distinction between knowing how to perform and actually performing forms the basis of today's competence based qualifications. Is knowing what one should do in a particular situation acceptable? Should there be evidence that consistent and acceptable performance has taken place? These points will be discussed with higher-level personnel in the context of general and specific competencies as indicated below.

With NVQs the term 'acceptable' is related to industry standards. Eraut (1994, p.164) does feel that specific content claims 'are only limited to a range of tasks and do not imply that an individual can perform outside of this specific activity'. This leads to a wider debate on whether the use of the term 'competence' is referring to a person's specific or general competence. The public perception of a competent person may assume that their ability stretches across a range of specific duties. Eraut (1994) feels in heterogeneous professions this generalisation could be dangerous. The individual may only have been exposed to a range of situations and therefore does not have the breadth of knowledge and/or expertise to perform competently in other areas. In today's rapidly changing world is it enough for professionals to only be competent in a

limited range of competencies? Indeed, professional bodies such as the CIOB, claim through the work of John Bale that 'it is in the nature of modern professionalism that the spheres of interest of separate professions overlap, and that the terms used to describe them are somewhat arbitrary' (Bale, 2010). This suggests that the modern professional may not have expertise in only one area but that it could span several areas. The concept of general and/or specific competencies will be explored through the structured interviews with higher-level personnel in the construction industry.

Given the apparent ambiguity of the definition, and the need to extend the debate on the term 'competence', four models of professional competence and skill acquisition are critically appraised to identify common ground. These will be used in the development of structured interview questions to higher-level personnel.

2.4 Models of professional competence

2.4.1 Cheetham and Chivers (1998) model of professional competence

Cheetham and Chivers (1996) conducted research into how professionals became professionals and the education and/or training they needed to enable them to be professional. Through this work a provisional model of professional competence was developed, which was later amended to Cheetham and Chivers (1998) revised model of professional competence (Figure 2.1). Both models stressed the importance of developing professionals and four core components were derived from the key influences mentioned above. These influences, along with the different categories or levels of learning taken from Bloom's cognitive Taxonomy of Learning, identified in Chapter 4, provide the foundation for the four components of professional competence, which are:

- Functional
- Personal/behavioural
- Knowledge/cognitive
- Values/ethics

Cheetham and Chivers (1996, p.24)

Meta-competencies provide an overarching cover to the four core components.

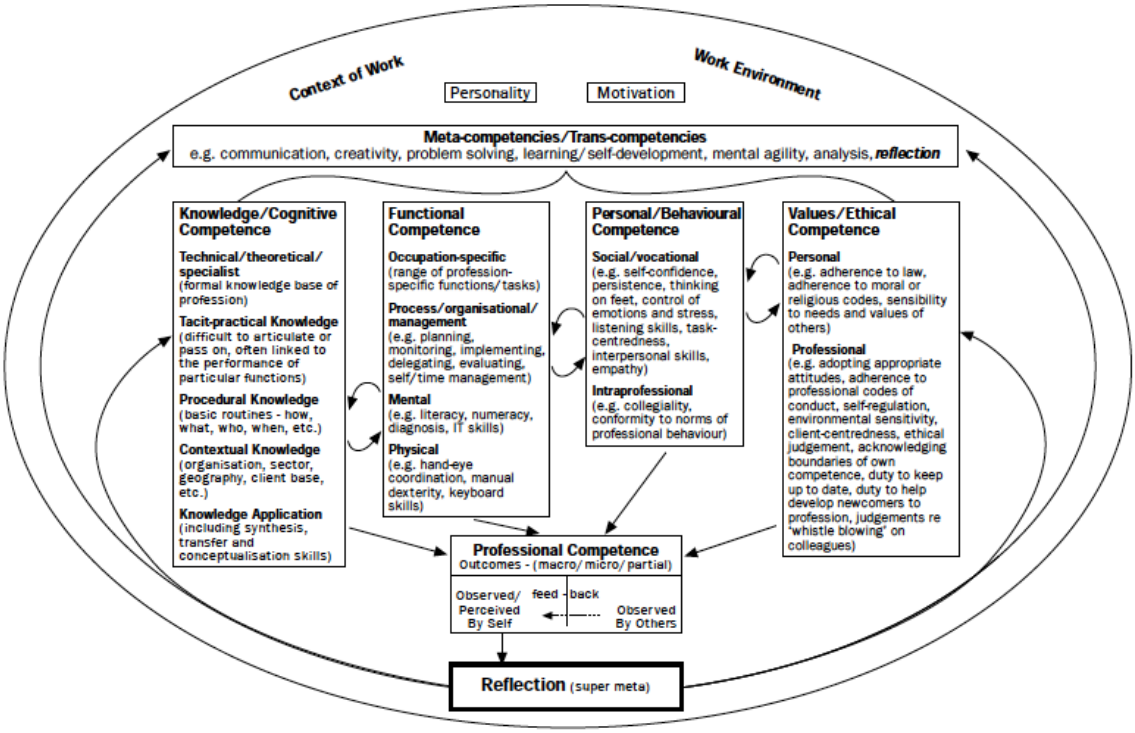


Figure 2.1: Cheetham and Chivers revised model of professional competence (Source: Cheetham and Chivers, 1998, p.275)

These meta-competencies, the four key components and the sub-groups of individual competencies produce three specific outcomes. Cheetham and Chivers (1998, p.269) identify these as:

- 'macro-outcomes – the broad overall (or perhaps long term) results of professional activity
- micro-outcomes – these were the outcomes of more specific activity
- partial outcomes – the result of a partially complicated activity'.

The achievement of outcomes is based on either ones own perception of performance or the perception of others. Feedback provides an evaluation of that performance or behaviour and through reflection can be used to enhance performance in the future. Spaul (2011) sees reflection as a way of improving practice and the process consists of challenging the norm and accepting there may be other and more appropriate ways of doing something.

Spaul and Odeleye (2011) believe that there are five stages needed to turn reflective practice into action. It starts with the identification of the current situation to establishing the baseline. Through reflection, deficiencies in current practice are identified and noted. Changes to working practices are proposed and documented. Changes are implemented, reflected upon and lessons leant identified.

Cheetham and Chivers (1998) revised model of professional competence can be compared with the views of Jones (2010) and the important attributes of a professional engineer (Table 2.2).

Table 2.2: The important attributes of a professional engineer (Source: Jones, 2010, p.330)

Important attributes of a professional engineer
Technical Ability to think mathematically, sound knowledge of appropriate basic science, good knowledge of a specific discipline, maintenance of current knowledge and practice.
Personal Ability and willingness to learn, appreciation of limits to knowledge, good communication skills, appreciation of international dimensions.
Professional Commitment to high standards, appreciation of personal and ethical responsibilities, ability to handle uncertainty, ability to communicate effectively.
Managerial Ability to work in a team, appreciation of management concepts and issues, ability to lead and manage personal, financial and technical resources.

Both Cheetham and Chivers (1998) and Jones (2010) see knowledge (technical, practice, contextual) and its application as being an important part of becoming a professional. Personal competencies are included by both sets of authors and being able to communicate and listen to others is seen as a key feature. Professionals are expected to 'adhere to ethical standards and uphold themselves' (Australian Council of Professions, 2004) and both Cheetham and Chivers (1998) and Jones (2010) believe this is part of being a professional. Finally, Cheetham and Chivers (1998) identify that a professional must have functional competence. Jones (2010) shares this view, insisting that professionals have attributes away from pure technical engineering with a managerial attribute. Jones (2010) does not however include the art of reflection as an important attribute of the professional engineer, whereas the revised model by Cheetham and Chivers (1998) highlights the importance of reflection and how it provides feedback both during and after an activity. This

embraces Schön's 'reflecting-in-action' and 'reflecting-on-action' concept of modifying behaviour.

Cheetham and Chivers (1998) identified that there are four core components of professional competence. Views from higher-level personnel in the construction industry will be sought on the importance of each core component and emerging ideas will be used to develop an integrated model of PDP and WBL.

2.4.2 Miller (1990) framework for clinical assessment

Miller's framework for clinical assessment (Figure 2.2) provides a useful model with which to define a competent person. The framework shows a sequence of stages identifying factual knowledge, application of knowledge and demonstration of skills at the first three levels, all of which could be carried out in an academic setting, whereas the top level 'does' is predominately occurring in the workplace. According to Miller (1990) the higher up the pyramid an individual goes, the greater is their knowledge and their ability to apply that knowledge. 'Knows' and 'Knows How' are the basic cognition elements of competence and 'Shows How' and 'Does' are the behaviour elements. They have long been seen as the 'domains of action or performance, reflecting clinical reality' (Aaron, 2009, p.1101).

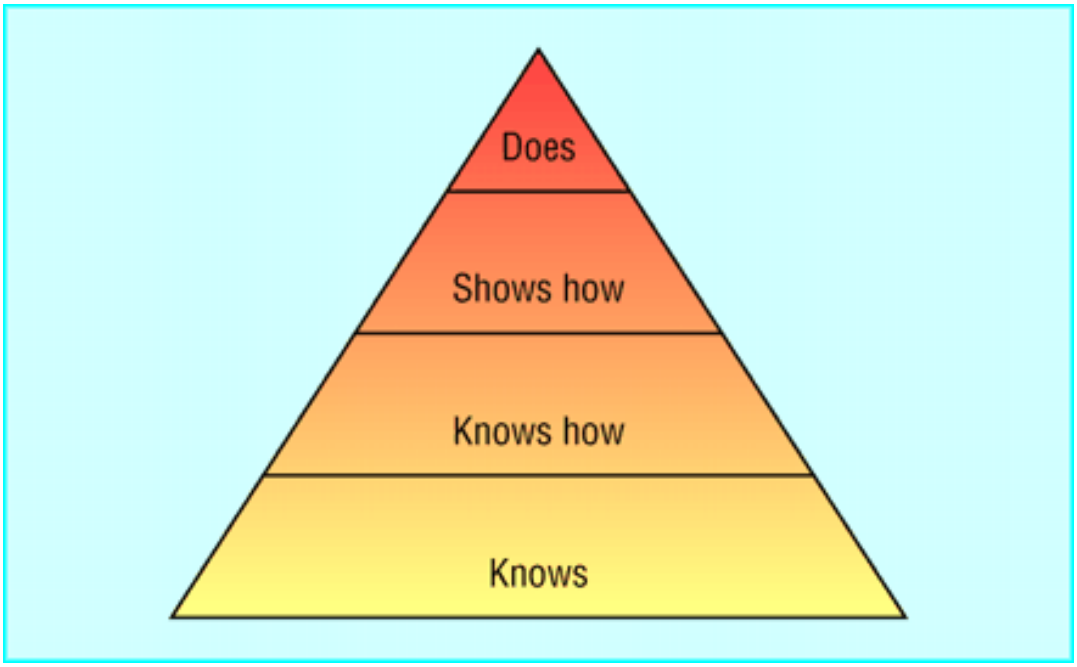


Figure 2.2: Framework for clinical assessment (Millar, 1990)

Miller's pyramid indicates the distinction between competence and performance. Senior (1976, cited in Wimmers, 2006, p.11) defines competence as 'what a physician is capable of doing and performance as what a physician actually does'. This introduces the concept of ability and whether ability should precede capability and whether capability always leads to an increase in performance. It is clear that there is no perfect line drawn between competence and performance and where one stops and the other begins. There is a grey area in the middle making the responsibility of testing for competence and subsequently performance difficult to carryout objectively and with reliability.

Carr (2004, p.64) does not necessarily agree that 'Miller's triangle assumes that competence predicts performance'. Human factors such as tiredness and mood swings can affect performance. How a person behaves on one day may be different to another and therefore 'Knowing' and 'Showing' are not always inter-related and a true predictor of performance in practice.

If an individual achieves the top level, are they deemed competent through performance? Should competence be achieved over time or a number of times

and does competence automatically assume performance? Competence is not real; it exists in a false environment. Within competence-based qualifications such as NVQs, an amount of evidence can be simulated. A fictional scenario is created to enable evidence to be fabricated. Performance, on the other hand is real, it happens on a daily basis in everyday life (London Deanery, 2011).

Miller's pyramid provides a framework in which the clinical profession can work and allow individuals to enhance their clinical competence (Wimmers, 2006). The model, through the four levels, indicates how the knowledge gained can be applied in a workplace setting to influence competence and performance. Higher-level personnel in the construction industry will provide feedback on Miller's pyramid and whether the model can be applied to construction management.

One thing appears certain; students cannot learn education for professional competence before the basic educational competencies. Solbrekke and Karseth (2008, p.235) adds 'knowing is not enough for doing, nor is doing enough for learning.' Students need the basic skills, the building blocks of education to enable them to develop, synthesise and analyse complex situations. Key skills are vital in developing the person to become a competent individual.

2.4.3 Dreyfus and Dreyfus (1980) model of skill acquisition

Reflection and experiential learning are excepted ways of learning new knowledge and skills in the workplace. The experiential learning cycle of Kolb (1984) is well documented and it provides a useful reference point in identifying the importance of experience and reflection in improving knowledge and skill development. Individuals need to reflect on what has happened if their learning is to be improved (Robotham, 2003, p.474).

The work of Fitts and Posner (1967) on enhancing human performance suggests the process of learning is sequential and occurs through three stages

of motor skill development: cognitive, associative and autonomous. The cognitive phase involves forming a mental picture of each stage of acquiring the skill. The associative phase involves putting the mental picture of performing the skill into action and the autonomous phase involves being able to carry out the skill without any conscious thought being given to its performance. This concept is not dissimilar to the model of directed skill acquisition proposed by Dreyfus and Dreyfus (1980) who identify five stages or levels through which an individual passes as they move from a novice to show expertise of a skill. Sedaei (2003, p.1) describes this as 'the distinction made between "knowing that" and "knowing how"'. To move along this continuum, Dreyfus and Dreyfus (1980, p.5) indicate the importance experience plays and only experience with 'concrete cases can account for higher-levels of performance'. Dreyfus and Dreyfus's model is shown in Figure 2.3.

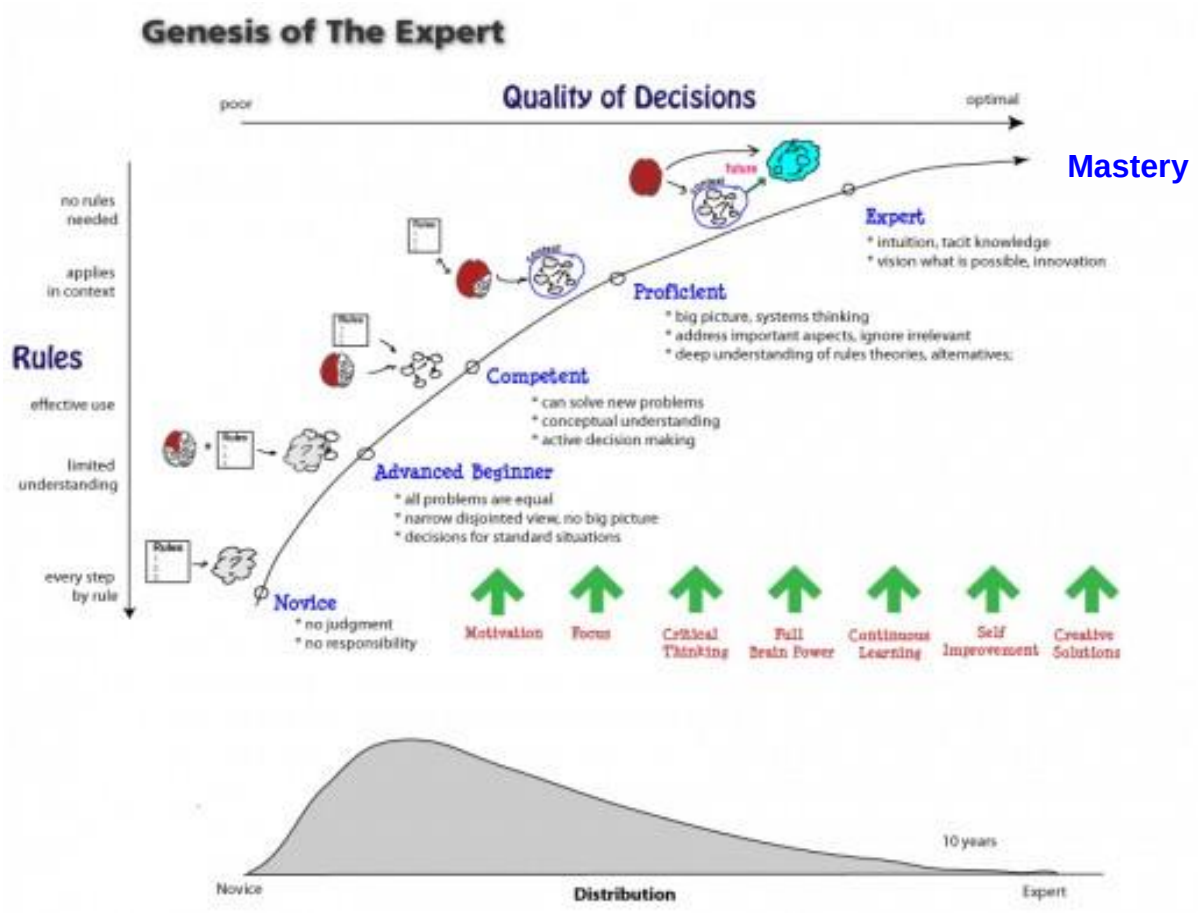


Figure 2.3: Dreyfus and Dreyfus (1980) skill acquisition model (Source: Adapted from Kumar, 2011)

The first stage of the model focuses on the beginner or novice. Here the tasks given to the beginner are made non-situational which allow for the beginners' lack of experience. 'The beginner is then given rules for determining an action on the basis of these features' (Dreyfus and Dreyfus, 1980, p.7). Through their own general ideas and learning of the roles, the novice with appropriate mentoring and support can move to the second stage of competence. First year at university (level 4 work) is about gaining 'knowledge of the underlying concepts and principles associated with their area(s) of study, and an ability to evaluate and interpret these within the context of that area of study' (QAA, 2012b, p.8). This fits the profile of a novice/beginner requiring considerable support.

The second stage of the model focuses on the advanced beginner. Situational perception is still limited but the rules are being adapted from one situation to another. The advanced beginner is starting to work across disciplines (Moore and Burges, 2010, p.16). The second year at university (level 5 work) is about having the 'ability to apply underlying concepts and principles outside the context in which they were first studied, including, where appropriate, the application of those principles in an employment context (QAA, 2012b, p.9). The student is starting to work outside of their comfort zone but still requires appropriate support.

The third stage of competence only comes about after time spent gaining experience and undertaking work in real situations (Dreyfus and Dreyfus, 1980, p.8). Sedaei (2003, p.2) sees the individual being involved personally with the task and is able to make decisions on the best course of action. The instructor can create guidelines within which the 'learner' can operate. If competence is referring to experience then this goes beyond final year (level 6 work) at university. As identified earlier in the chapter, Trinder (2008) and Kirscher and Van Vilsteren (1997) suggest that competence is about knowledge and skills, a view shared by Dreyfus and Dreyfus (1980). A placement opportunity for full time students, or experience gained by undertaking a part time degree has the potential to allow the application of knowledge and skills thus demonstrating a

students' 'ability to deploy accurately established techniques of analysis and enquiry within a discipline' (QAA, 2012b, p.10).

The fourth stage of proficiency exposes the 'learner' to many different contexts (Dreyfus and Dreyfus, 1980, p.10). These whole experiences are stored so that when similar situations arise they provide the basis for future action. The 'learner' may still have to think about alternative courses of action rather than act intuitively.

The fifth stage of expertise shows that the 'learner' has now reached the level of experience where they have a detailed understanding of what has to be done (Sadaei, 2003, p.2). As Dreyfus and Dreyfus (1980, p.12) point out 'his repertoire of experienced situations is so vast that normally each specific situation immediately dictates an intuitively appropriate action.' Rules are relaxed and the quality of the decisions made has reached an optimal level.

The sixth level of mastery goes beyond the original five stages proposed by Dreyfus and Dreyfus. They see this as the highest level of mental capacity. Mastery only takes place, according to Dreyfus and Dreyfus (1980, p.14) when the individual acts on autopilot and does not need to spend time and energy reflecting what has gone on before but instantaneously knows what to do next.

Cheetham and Chivers (2000, p.382) support the above view and suggest 'as people become more expert, they rely less on rules, guidelines or maxims and more on an intuitive grasp of situations, based on tacit understanding'. To achieve the expected levels of expertise requires, not only experience, but also some form of technical knowledge. In order to become a professional and achieve higher-level skills, knowledge and experience are required but that experience needs to be at a lower level (Kumar, 2011). The point is also picked up by Cheetham and Chivers (2000, p.382) who see the technical and experiential approach as a modification 'which attempts to redress the balance between specialist knowledge and between rational analysis and intuitive artistry'.

The model identified by Dreyfus and Dreyfus (1980) recognises the stages a 'learner' goes through in achieving mastery of a task but is the model appropriate in all situations. Sadaei (2003, p.2) does not feel that the model is appropriate to a 'learner who is learning pure facts' e.g. today's date. Factual knowledge covers the basis building blocks a learner needs to know in order to solve problems. Knowing today's date requires some thought but little analysis and definitely not the levels of mastery mentioned by Dreyfus and Dreyfus. The model is also week on the importance of reflective practice and as Eraut (1994, p.128) points out 'its neglect of … especially the self-evaluation of profession work'. The importance of 'concrete experiences' and their relationships with higher-levels of performance will be explored further through structured interviews with higher-level personnel.

2.4.4 Pavalko (1971) occupational-profession model

The occupational-professional model developed by Pavalko (1971) identifies a number of characteristics that set professionals apart from other occupations. The work of professionals centres on having extensive knowledge and expertise to carry out a range of tasks over a wide spectrum of activity. Clients and society as a whole expect the work to be executed in a way that demonstrates ethical principles and standards of behaviour (Mayer, 1988, p.313).

Pavalko's model (Table 2.3) defines a number of key features (characteristics or traits) that work activities possess and the extent to which they occur provides a differentiating line between occupation and profession (Bilodeau, 2004; Ovretueit, 1998).

Table 2.3: The Occupational-Professional Model (Source: Bilodeau, 2004, cited in Pavalko, 1971, pp.17-27)

Dimensions	Occupation	Profession
1. Theory, intellectual technique	Absent	Present
2. Relevance to social values	Not relevant	Relevant
3. Training period A B C D	 Short Non-specialised Involves things Subculture	 Long Specialised Involves symbols Subculture
4. Motivation	Self-interest	Service
5. Autonomy	Absent	Present
6. Commitment	Short-term	Long-term
7. Sense of community	Low	High
8. Code of ethics	Undeveloped	Developed

The model of traits proposed by Pavalko (1971) does not pigeonhole an activity into being an occupation or a profession but merely places it along the varying continuum between occupation and profession. This continuum of traits and the degree to which they are satisfied leads to a very subjective view of when an occupation becomes a profession. Goode (1960) provides a further observation with the suggestion that there are limits as to how far some occupations could become professions and for an occupation to be deemed professional two 'core characteristics' must be present. These two 'core characteristics' are 'a prolonged specialized training in a body of abstract knowledge and a service orientation' (Goode, 1960, p.903). This definition suggests theoretical knowledge is not an option. If that is the case, why are there many degree courses that are discipline specific e.g. BSc Construction Management? The definition appears to lack credibility or cannot see the value of vocationally orientated courses, which provide abstract, theoretical and applied knowledge.

Freidson (1970, p.77) sees the core elements (identified earlier) as ‘critical criteria for professions insofar as they are said to be causal in professional autonomy’. That said the characteristic emphasising ‘prolonged specialist training in a body of abstract knowledge’ is rather vague and difficult to quantify. What duration is ‘prolonged’ over and is there a minimum or maximum time period? How specialised is ‘specialised’ and when does abstract become theoretical and then applied (Freidson, 1970, p.78).

The concept of a service orientation as Freidson (1970, p.80) points out, refers to ‘the orientation of the individual members of an occupation than to the organisation’. This implies that the individuals need to be observed to determine if they demonstrate the traits of a professional. Freidson (1970, p.82) highlights this as ‘autonomy in a position of legitimate control over work’. This autonomy must exist in the context of ones work and within the boundaries set by the profession.

The themes behind the occupational-professional model developed by Pavalko (1971) will be discussed with higher-level personnel to elicit their views on whether they see themselves as a professional.

2.5 Achievement of professional knowledge, competence and expertise

Learning in itself is an education. You need to be able to learn the skills of learning before applying for a job (Cottrell, 2010). Degrees in vocational subjects educate students in both generic and career specific skills and competencies related to work. Solbrekke and Karseth (2006, p.96) share the above view and feel there are two reasons for higher education, ‘one is to train people for practical and technical work and the other is to foster civic engagement.’ Universities have a duty to educate the whole person, allowing the individual to have a leading role in society. There must be a commitment to educate the professional in moral values.

The research of Solbrekke and Karseth (2006) on professional responsibility focussed on gathering data from thirty-six first year Swedish undergraduate students on professional courses; law and physiology. Students were questioned on their educational and work orientations as well as their ideas of future professional roles and responsibility. Solbrekke and Karseth's research concluded with the observation, when entering higher education students 'have desires and wishes to be educated for professional work embedded with professional obligations beyond the scope of their ego interests' (Solbrekke and Karseth, 2006, p.115). Is this replicated at UK universities and if so, in what ways do universities push ethical and moral dimensions of professional responsibility? This will be explored through the questionnaire to final year built environment students at Anglia Ruskin University.

The evidence suggests a professional knowledge base is seen as a pre-requisite to becoming an expert in ones own field. This very point forms the basis of Miller's framework of clinical assessment. The knowledge base usually begins with a subject related qualification, usually an honours degree. Students should cover subject specific as well as abstract knowledge from other disciplines therefore expanding the parameters of their knowledge base. The two to three years post-graduation provide an appropriate opportunity to mould individuals professional practice experience (Eraut, 1994, pp.11-14).

Jones (2010) supports the view of Miller (1990) and Dreyfus and Dreyfus (1980) by suggesting that a professional engineer needs more than general knowledge and technical skills. According to Jones (2010, p.330), 'engineers are expected to have effective communication, business and managerial skills, team working and leadership abilities, ethical and environmental awareness and so on'. Universities are at the heart of society and a have a responsibility to educate and develop the next generation of higher-level personnel that possess the range of knowledge, skills and attributes needed for industry. The Department for Education and Skills (2003, p.4) white paper on the Future of Higher Education states that:

> ‘Our higher education system is a great asset, both for individuals and the nation. The skills, creativity, and research developed through higher education are a major factor in our success in creating jobs and in our prosperity. Universities and colleges play a vital role in expanding opportunity and promoting social justice. The benefits of higher education for individuals are far-reaching. On average, graduates get better jobs and earn more that those without higher education.’

The ARU (2012b) Corporate Plan 2012 – 2014 emphasises the importance of an employability strategy which supports the development of skills aimed as helping students into jobs. This fits with Solbrekke and Karseth (2006, p.95) view ‘to train people for practical and technical work‘ thus meeting the demands of society for an employable workforce.

2.6 What is professional practice in construction management?

2.6.1 Introduction

Section 2.2 provides a useful discussion on the terms “profession, professional and professionalism” through the work of Cheetham and Chivers (2000). The phrase ‘professional practice’ is briefly introduced. According to the Education Evidence Portal (2009) ‘The essence of professionalism lies in the confidence and trust that a client must be able to place in someone with specialised knowledge and/or skills’. Indeed the work of Schön (1983) on ‘reflection-in-action’ is a key driver of engaging professionals in professional practice. This concept of reflecting whilst undertaking an activity and ‘reflecting-on-action’, after the activity has been completed has important features of many education and training courses. Kolb (1994) sees this as an important part of the learning cycle.

Cheetham and Chivers (2000, p.375) see Schön’s work on professional practice more as a form of ‘artistry than applied theory’. Girard, Linton and Besner (2005, p.3) view it as ‘continuous development of self and others’ and

Cheetham and Chivers (2000, p.377) see it as 'the application of their specialist knowledge'. All of these definitions infer that professionals never stop learning and are continuously making decision based on past knowledge and experience. Eraut (1994, p.223) sees the key features of professionalism in professional practice as having a 'specialist knowledge base, autonomy and service'. This fits well with the ethos of the CIOB and their code of conduct.

2.6.2 Code of professional practice

It is worth noting, now that the importance of professional practice has been stated, many professional bodies have a code of professional practice. The professional practice codes and rules provide the way in which members of that professional body should behave and conduct themselves. The theme running through the codes and rules is one of fulfilling ones professional responsibility, behaving with integrity and discharging their duties with complete fairness, accuracy, loyalty and honesty. Dyer (1985, p.73) sees trustworthiness as an important criterion of professional status and the professional code of conduct as a way of ensuring professionalism is maintained.

The CIOB operate a strict code of conduct that they expect their members to abide by. Within this, the CIOB's role is to:

> 'Promote the importance of the Built Environment
> Lead the industry to create a sustainable future worldwide
> Encourage leadership potential
> Set the highest standards in quality, safety and qualifications
> Create an industry where excellence prospers.'
>
> CIOB (2012b)

The CIOB rules and regulations give guidance to members and provide a framework for professional practice.

2.6.3 What is construction management?

The term ‘construction management’ is associated with the built environment and covers the professional side of the construction process. Many construction managers carryout a site management function, supervising and directing operations on a construction project. According to the CIOB (2010), an inclusive definition of construction management is:

- ‘Management of the development and improvement of the built environment;
- Exercised at a variety of levels from the site and project, through the corporate organisations of the industry and its clients, to society as a whole;
- Embracing the entire construction value stream from inception to recycling, and focusing upon a commitment to sustainable construction;
- Incorporating a wide range of specialist services;
- Guided by a system of values demonstrating responsibility to humanity and to the future of our planet;
- Informed, supported and challenged by an independent academic discipline.’

CIOB (2010)

This definition covers the many facets of construction management and the interaction between the different disciplines of ‘planning, design, production, adaptation, maintenance, restoration, conservation, management, evaluation and recycling’ (CIOB, 2010). Construction management is not just about individuals or individual activity, it is about carrying out the construction management function as part of a wider team completing several tasks, often at the same time in order to manage the construction project (Jackson, 2010, p.40).

2.6.4 Skills and competencies needed for construction management

There are numerous skills and competencies required of a construction manager, however establishing an exact set that all interested parties agree on, becomes difficult. The National Occupational Standards (NOS) that support the construction industry provide a set of generic standards for particular disciplines and occupations across the built environment.

The Construction Industry Council (CIC, 2013) has converted the existing ConstructionSkills NVQ/SVQ Units (based on NOS) into the Qualifications Credit Framework for England/Wales (QCF) and the Scottish Credit and Qualifications Framework (SCQF). For construction management there are two main areas that are applicable from the suite of NOS:

- Construction contracting operations management
- Construction senior management

These NOS describe the competencies that are required to carry out or undertake a particular job in construction management. They can also be used to 'identify training needs, skill gaps and describe job descriptions' (CIC, 2013). Chapter 4 makes reference to the NOS and how they are used to produce the set of QAA Subject Benchmark Statements for an honours degree covering Construction, Property and Surveying. The chapter goes on to discuss the formation of the Graduate Common Learning Outcomes (GCLO) against which new graduates in construction and built environment shall be judged (CIC, 2013).

The CIOB Education Framework is the 'CIOB published standard in construction management education' (CIOB, 2013a, p.4) and provides a baseline of learning across several key themes which may be incorporated in the education of students to become construction managers and other related professionals. Within each of the main components, the focus is centred on the

acquisition of knowledge rather than job specific criteria. This is very different to the NVQ route where the focus is on demonstrating competence and a level of knowledge and performance around specific construction management activity is assumed. The accredited qualification route presupposes that the individual is not undertaking any specific role but is looking to gain knowledge and skills across a wide range of construction management activity. A set of enhanced employability skills and competencies that are applicable to construction management are developed in Chapter 4. These are discussed with higher-level personnel in the construction industry and final year built environment students at Anglia Ruskin University.

As identified earlier in the chapter, NVQs infer competence since they are assessing an individual's knowledge and performance on particular criteria stated in the NVQ specification. Does an NVQ qualification automatically infer capability and does performance automatically occur once the competencies stated in the NVQ specification are achieved? Achievement of the four stages of Miller's Pyramid implies a level of performance once an individual is deemed competent. It does not however, specify the level, extent (depth) and range of the performance.

According to Kumar (2011), capability can be defined as the 'extent to which individuals can adapt to change, generate new knowledge and continue to improve their performance'. Work by Stacy (1996) and Stephenson (1995) identifies learning as taking place in the 'zone of complexity' as shown in Figure 2.4.

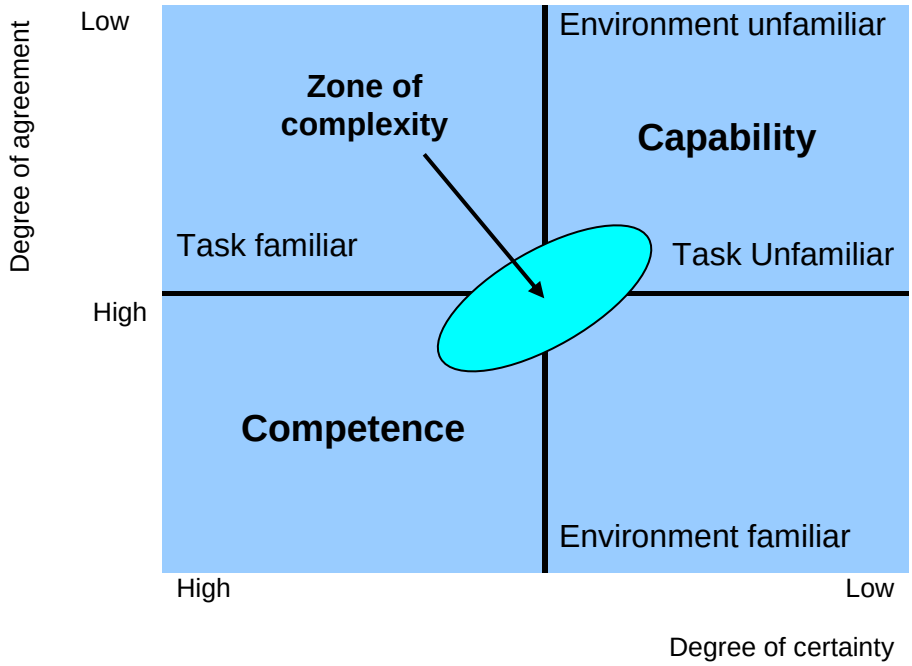


Figure 2.4: Competence and capability in complex adaptive systems (Based on Stacy, 1996; Stephenson, 1995, cited in Fraser and Greenhalgh, 2001)

Fraser and Greenhalgh (2001, p.800) identify this zone as occurring 'where relationships between items of knowledge are not predictable or linear, but neither are they frankly chaotic'. The move from being competent to capable is based on ones ability to cope with unfamiliar tasks in an unfamiliar environment. It is about applying textbook knowledge to those unfamiliar situations. Fraser and Greenhalgh (2001, p.800) believe 'An education process that provides feedback about performance as it takes place will enhance capability'. The reflective process mirrors that identified by Kolb (1984) and Schön (1983).

According to Kumar (2011), Dreyfus and Dreyfus identify an expert as someone whose practical experience allows them intuitively to perform at a professional level. Having the ability to effectively link together knowledge from different areas, which at first sight do not appear to be related, is the mark of a modern expert (Fraser and Greenhalgh, 2001, p.800). It would appear from the

literature, that an expert on Dreyfus and Dreyfus's skill acquisition model would be deemed capable.

The findings of an overview report prepared by Edwards (2009) from four foundation degree projects identifies the higher-level skills and knowledge areas that employers and their representatives consider to be most important for construction managers. Project 1 involved Foundation Degree Forward (fdf) East England and the National Construction College (NCC), Project 2 fdf Yorkshire and the Humber Region (YH), Project 3 fdf North West Region and the University of Cumbria (UOC) and Project 4 fdf East Midland Region (EM) and Nottingham Trent University. Each of the regional foundation degree projects focuses on employer 'needs and wants' for a foundation degree and Edwards (2009, p.1) describes this as providing ' … an excellent set of case studies to consider the viability and usefulness of developing a national specification for an Foundation Degree in Construction Management'.

Table 2.4 summarises the most common areas from the four projects.

Table 2.4: Higher-level skills and knowledge requirements from the four foundation degree projects identified by Edwards (2009)

Project	Higher-level skills and knowledge requirements					
National Construction College (NCC)	Four phases of construction management process	Management of relationships	Sustainability	Commercial aspects	Regulatory aspects e.g. H & S	Construction techniques and improved/ modern methods of construction
Yorkshire and the Humber Region (YH)	Major components of a construction project	Understanding of the contributors/ stakeholders in a construction project		Contract admin and management		
North West Region and the University of Cumbria (UOC)	Overall construction management process and key elements	Multi-disciplinary project management	Sustainability/ Green construction	Estimating, pricing and bidding	Health and safety	Modern methods of construction
East Midland Region (EM) and Nottingham Trent University	Overall construction management process and key elements	Supervisory and people management skills	Sustainable construction	Contract admin and sub-contracting law	Health and safety	Civil engineering

The information demonstrates the need to have an underpinning knowledge base across the whole construction project and life cycle and be able to apply that knowledge within a practical context. Within the foundation degree projects, modern methods of construction, sustainability and business management skills and regulations are seen as vital parts of the education process along with people management, project management and building construction (Edwards 2009, p.15). These common areas compare favourably with the seven components of the CIOB Education Framework. The information from NOS and the higher-level skill and knowledge requirements, identified by Edwards (2009) will be used in the development of a 'super suite of employability skills and competencies'.

2.7 Formal and informal learning

According to Andresen, Boud and Cohen (1999, p.225) 'Learning is influenced by the socio-emotional context in which it occurs' and it can take place in both a formal and informal setting. Traditionally a formal setting would be associated with an education course at college or university, such as a degree in construction management. This would usually be delivered in the classroom, facilitated by a tutor, with a set structure to the acquisition of knowing-what and knowing-why. An informal setting would be linked to the workplace and would centre on the individual's social group and their interaction with work colleagues.

Colley and Malcolm (2003, p.315) see informal learning as not having a pre-defined curriculum with time constraints on achieving the learning. Informal learning can take place in many different settings, which allow greater freedom for learners (Eraut, 2004, p.247). Informal learning can go unnoticed as it can take place between activities, usually in the workplace.

Hodkinson, Colley and Malcolm (2003) feel that the separation of informal and formal learning does not have wide agreement as it stereotypes the way in which learning occurs. The characteristics of informal and formal learning should be recognised in the learning activity rather than where that activity takes place. Learning takes place in different settings, through different means with different expected outcomes and can be demonstrated in different ways. Just because the setting is different, university or the workplace, it does not mean the type of learning is different. Both informal and formal learning have value and should be treated equally. Appendix 2.2 identifies the strengths and weaknesses of both types of learning.

Within the field of construction management, formal and informal learning takes place in many different ways. The thirst for learning is based on the economics of supply and demand. As the economy improves and the shortage of skilled personnel becomes apparent, one solution is to engage semi-skilled and

unskilled people in work. With this comes the need for knowledge, skills and competencies that are probably lacking. Werquin (2010, p.8) sees formal and non-formal learning as ‘a credible alternative or complement to training’.

Formal learning or formal education (Gunn and Goding, 2009) takes place within a structured framework of learning outcomes and assessment criteria. In the construction management field this is likely to take place in a college or university. There are thirty-five construction management related honours degrees identified on the UCAS website (UCAS, 2012). At Anglia Ruskin University, construction management is taught at both foundation degree and honours degree level. The learning process on both courses is well defined in terms of time e.g. BSc Construction Management should take 3 years for a full-time student, the course content is pre-selected as indicated on Course Specification Forms (CSFs) and MDFs, and each module has dedicated tutors to deliver the course content and support students. This suggests both courses are highly structured and have all of the strengths of formal learning.

Practical experience is an important part of university education. This has now been recognised by the Joint Board of Moderators (JBM) for civil engineering pathways. From 2015, ‘50% of all academic staff designated as delivering accredited degree programmes must be professionally qualified’ (JBM, 2012). To become professionally qualified, a Member of the Institution of Civil Engineers (MICE), candidates must meet the core objectives, which imply there must be an element of practical experience.

Formal and informal learning does occur in both an educational institution and the workplace, with each location having a role to play in the development of the professional. Rather than being critical of the location, the value of that learning should be evaluated.

2.8 Chapter summary

The results of this chapter will be tested through structured interviews with higher-level personnel in the construction industry. Evidence from published literature suggests that individual professionals should be competent and act in an ethical way (Institute for Learning, 2009). The professional must possess 'specific skills' and knowledge (Boone, 2001; Pavalko, 1971) but the traditionalist's view that professionals are seen as experts may be out-dated (Eraut, 1994). Stebbins (1992) provides a useful list of attributes, which may be common to the role of the professional and those in professional practice. This list of attributes will be explored further through structured interviews with higher-level personnel in the construction industry. The study by Solbrekke and Karseth (2006) identified that Swedish undergraduate students on professional courses wish to be educated in ethical and moral dimensions of professional responsibility. This will also be explored further in the thesis at the author's own institution.

The chapter considered the role of the professional body and published literature questioned whether the term 'professional' had been diluted (Bilodeau, 2004). The notion of graduate level entry as the only route to professional body membership will be explored later in the thesis.

The chapter critically appraised four models of professional competence (Cheetham and Chivers, 1998; Miller, 1990; Dreyfus and Dreyfus, 1980; Pavalko, 1971). The four components of professional competence: knowledge/cognitive, functional, personal/behavioural and values/ethics (Cheetham and Chivers, 1998) and the four stages leading to professional competency (Miller, 1990), will be explored further through the use of structured interviews with higher-level personnel in the construction industry. The importance of 'concrete experiences' (Dreyfus and Dreyfus, 1980) and the distinction between an occupation and a profession (Pavalko, 1971) will also be explored in the structured interviews.

The chapter identified that formal and informal learning can occur in both an educational institution (university) and the workplace and that the characteristics of learning shall be recognised in the learning activity rather than where the learning takes place (Hodkinson, Colley and Malcolm, 2003). Practical experience is seen as an important part of university education (JBM, 2012).

Evidence from the literature (CIOB, 2010; QAA, 2010; Edwards, 2009) suggests that there are numerous skills and competencies required of a construction manager, however establishing an exact set is difficult. It would appear there is a link between an academic award leading to professional membership and the skill acquisition model proposed by Dreyfus and Dreyfus (1980). This raises the question; can a work-based qualification be linked to an education qualification and what are the real skills, competencies and knowledge needed for construction management? The thesis will aim to explore those skill and knowledge sets that higher-level personnel feel are important in the field of construction management.

3.0 The Process of Learning and the Acquisition of Knowledge

3.1 Introduction to the chapter

The purpose of this chapter is to discuss from published literature the concept and process of learning and to identify the ways in which students learn. The literature review reveals that a common theme to learning is a 'change of behaviour', however not all psychologists agree on how learning takes place.

Four theories of learning are discussed: behaviourism, cognitivism, constructivism and humanism. Through each of these philosophical frameworks, the works of the most influential psychologists are identified and their work is related to this research project. The work of Schön (1983) on reflective practice is discussed and this is related to the work of Kolb (1984) and his experiential learning cycle.

The chapter concludes with a definition for 'knowledge' and a discussion on the work of Gibbons et al. (1994) and Eraut (1994) around mode 1 and mode 2 knowledge. Finally the chapter explains how students apply knowledge and this is discussed in relation to Bloom et al. (1956) Taxonomy of Learning.

The chapter has informed the range of questions given to undergraduate final year students at Anglia Ruskin University in the Department of Engineering and the Built Environment. Students are asked for their opinion on how and why they learn, which learning environment they prefer, the importance of reflective practice and how well they apply knowledge. The responses inform the development of the integrated model of PDP and WBL.

3.2 What is learning?

In order to make a contribution to learning, teaching, knowledge of the academic area and scholarship in the subject, one needs to know what the term means. The Concise Oxford English Dictionary defines learning as 'knowledge acquired by study, acquire or develop a particular ability, receive information, acquire knowledge or skill'. Atkinson et al. (2000, p.234), describe learning as 'a relatively permanent change in behaviour that results from practice' whereas Cobb (2010) sees learning as 'the lifelong process of transforming information and experience into knowledge, skills, behaviours and attitudes.' Learning is about involving oneself in the experience and having an understanding why events have occurred. Burns (1995, p.99) has the view that learning involves a change of behaviour, which can be observed through a person's action but also through the way they think, behave and react. Learning is provoked by situations rather than spontaneous actions. This could be through the work of the teacher or by an external situation (Piaget, 1964). Pritchard (2008, p.2) provides the following definitions of learning in Table 3.1.

Table 3.1: Definitions of learning (Source: Pritchard, 2008, p.2)

Definitions of learning
A change in behaviour as a result of experience or practice.
The acquisition of knowledge.
Knowledge gained through study.
To gain knowledge of, or skill in, something through study, teaching, instruction or experience.
The process of gaining knowledge.
A process, by which behaviour is changed, shaped or controlled.
The individual process of constructing understanding based on experience from a wide range of sources.

A common theme to these definitions is the term 'change of behaviour', however the orientation of the definer may have an influence on the style of definition provided. Atherton (2009) indicates that learning is not always about behaviour. Learning could be identified as a change of capability, or change in

knowledge or even understanding. The art of growing up, through maturity affects behaviour. Learning is about a change in attitude and knowing why that change has taken place. As Raelin (2008, p.14) states 'Learning is both a cognitive and a behavioural process', meaning finding out something new that was not known before as well changing the way one conducts oneself or one's actions based on new information.

A child's development is observed through a change in behaviour. As Olson and Hergenhahn (2009, p.1) state 'After learning, learners are capable of doing something that they could not do before learning took place.' The change in behaviour may not be obvious at once, but once learning has taken place there is the potential for a change in behaviour. This change will occur following an experience, positive or negative, or through practice. Not all psychologists agree that a change in behaviour results from experience. Instinct can play a part in a person's behaviour (Klein, 2009, p.2). Similarly, the learning environment affects the learning that takes place (Boud, Cohen and Walker, 1993, p.2). This suggestion will be explored further through the use of questionnaires to undergraduate final year built environment students in the author's own institution.

Olson and Hergenhahn (2009, p.2) also highlight that this change in behaviour is 'relatively permanent, that is neither transiting nor fixed'. Klein (2009, p.2) shares the same view that learning is 'a relatively permanent change in behaviour that results from experience'. What is relatively permanent and at what point is it assumed that knowledge has been gained? Olson and Hergenhahn (2009, p.3) feel it is where newer learning supersedes old knowledge or where over time, what was learnt has been forgotten. This process does not occur automatically, as motivation plays a part in the learning process (Klein, 2009, p.2).

Table 3.2 taken from Brown (2004, p.7) provides examples of students' perception of learning. Each example has implications for how students approach learning.

Table 3.2: Examples of students' perception of learning (Source: Brown, 2004, p.7)

Examples of students' perception of learning
1. *Learning as an increase in knowledge.* The student will often see learning as something done to them by teachers rather than as something they do for themselves.
2. *Learning is memorising.* 'Learning is about getting it into your head. You've just to keep writing it out and eventually it will go in.'
3. *Learning is acquiring facts or procedures that are to be used. "*Well it's about learning the thing so you can do it again when you're asked to, like in an exam.'
4. *Learning is making sense.* 'Learning is about trying to understand things so you can see what's going on. You've got to be able to explain things, not just remember them.'
5. *Learning is understanding reality.* 'Learning enables you to perceive the world differently.' This has also been termed 'personally meaningful learning'.

3.3 How do students learn?

Learning involves either 'doing' or being 'done to', however not all psychologists agree on the nature of the learning process. There is considerable information on how people learn with learning theorists coming from various disciplines of philosophy and psychology, having a different view on the process of learning.

Early learning theory can be traced back to the work of Plato and Aristotle. Plato believed the reflective processes of exploring ones own mind enabled knowledge to be gained (Olson and Hergenhahn, 2009, p.27). Aristotle was one of Plato's students and followed his teachings quite closely, but later broke away with his own ideas. The main difference between the two philosophers was in their attitude towards sensory information. Plato felt it was a hindrance,

whereas Aristotle felt it formed the basis of all knowledge (Olson and Hergenhahn, 2009, p.30).

Thomas Hobbs, early in the 17th century took up Aristotle's ideas and approved the notion that innate ideas are a source of knowledge. Hobbs believed that stimuli controlled the functions of the body and hence influenced a person's experience (positive or negative). The use of external stimuli is the focal point of behaviourism, which will be discussed later in the chapter.

There are numerous ways in which students learn. It can be through reading, thinking, observing, question and answer and doing. Learning can take place in many different environments from lectures, seminars, tutorials, workshops, practical sessions, and the workplace to the Internet. However, according to Brown (2004, p.8), the ways of learning identified above do not explain how students learn or why students learn. The answers to these questions lie in the various philosophical frameworks and theories of learning. The theories lie along a continuum with control and prediction (behaviourism) at one end and social values (humanism) at the other end. In between are cognitivism and constructivism (ibid).

3.4 Theories of learning

There are several categories under which learning theories can be grouped. The four theories below view learning from one end of a continuum of a positivistic world where objectivity and scientific methods hold true to an interpretivistic world that is subjective in nature.

3.4.1 Behaviourism

Behaviourism operates on the principle that ones behaviour is caused by external stimuli and as such behaviourists define learning as a relatively permanent change in behaviour as a result of an experience (Jordan, Carlile

and Stack, 2008, p.21). This change of behaviour can be observed and according to behaviourist theory, learning has taken place.

The Russian physiologist Ivan Pavlov became famous for his classical conditioning experiments with salivating dogs (Jordan, Carlile and Stack, 2008, p.21). Jack Watson studied this basic form of associative learning, where the learner responds to external stimuli in a particular manner. Pavlov noticed that the smell of food caused his experimental dogs to salivate (unconditional response). Pavlov repeated the experiment but rang a bell (a conditional response) immediately prior to providing the food. After the bell and food were used together several times the bell alone was sufficient to cause the dogs to salivate. Pavlov demonstrated how stimulus-response bonds are formed and how the theory of classical conditioning can be used to explain how people learn (Jordan, Carlile and Stack, 2008, p.21).

Watson extended Pavlov's work and applied it to human beings. His most famous experiment involved 'Little Albert', an 11 month old child, and Watson demonstrated using white rats and loud noises how an emotional fear response could be conditioned in humans.

Burrhus Frederic Skinner used positive reinforcement (reinforcement theory) to train rats to press a lever to obtain food and negative reinforcement to remove an unwanted stimulus such as pressing a lever to remove an electric shock (Jordan, Carlile and Stack, 2008, p.25). Skinner's work talked about students developing self-centred and self-motivating processes whereby students took responsibility for their own actions. They identified their own reinforcers such as setting targets and monitoring performance.

Although, stimulus-response psychology has largely disappeared from education (Berliner and Calfee, 2013, p.400), the concept of what a person can do, influenced by the notion of measurable outcomes, has influenced educational thinking in recent times. Over the last 20 years there has been a rapid rise in vocational education and the use competency-based approaches related to knowledge and performance evidence, which is mapped against set

criteria. Practical based NVQ courses follow a behaviourist model of reinforcement theory through repetitive processes. Learning takes place in small increments with students demonstrating their knowledge at predetermined points with regular tutor feedback to improve performance (Cheetham and Chivers, 2001, p.251). Where repetitive tasks are concerned such as learning a skill, reinforcement theory is useful, however where higher-level learning is needed, the approach is too rigid and mechanical (Dunn, 2002).

Degree courses at all higher education establishments need to follow the QAA reference point known as 'The UK Quality Code for Higher Education'. It sets out the formal expectations that all UK HE providers reviewed by QAA are required to meet (QAA, 2012a, p.1). The Anglia Ruskin Staff Guide 'Using Qualifications and Level Descriptors' has been written by the Quality Assurance Division of the Academic Office to provide the assistance needed for a Proposal Team to design and develop a set of course learning outcomes that are relevant to the qualification being proposed. As ARU (2008, p.1) state:

> 'These describe the characteristics and parameters of student learning and achievement for a given qualification. They are designed specifically to set and maintain a national comparability of academic standards and consistency of expected student achievement within the qualification concerned.'

Learning outcomes define the boundaries of the learning and what is expected, which enable students to become more independent by taking responsibility for their own learning (Brown, 2004, p.13; Jordan, Carlile and Stack, 2008, p.31). Although there is evidence to support the view that learning outcomes support learning, do students really understand and use them. All of the courses at Anglia Ruskin University must be formally approved as part of the university's validation process. The aim and intended learning outcomes of the course are stated and the means by which they are achieved and demonstrated is identified. For each unit of study (module), learning, teaching and assessment information must be written down. This covers a brief module description with outline content, an indication of what the student should be expected to achieve through the learning outcomes and details of the assessment methods and

weighting employed. In a true behaviourist model students would take responsibility for their own learning, in the same way Skinner's rats took responsibility when they wanted to obtain food. Supporting and developing students to take this responsibility may be achieved through the integrated model of PDP and WBL.

3.4.2 Cognitivism

Gestalt psychologists such as Bode, feel there is too much focus on the use of stimuli and single events to explain the behaviourist's view that learning had taken place. Cognitivists believe that learning can come from organising and processing information effectively. They are concerned with the act of cognition – the act or process of knowing and the study of mental functions covering the five basic processes involved in cognition – sensation, perception, attention, encoding and memory (Jordan, Carlile and Stack, 2008, p.36).

Cognitivists are interested in how the human memory is used to promote learning. Without a memory we cannot survive and carry out everyday tasks of walking, talking and solving problems (Brown, 2004, p.23). According to Turner (2005, p.26) 'Cognitive theory acknowledges the importance of mental development and processing in learning'. Jean Piaget was one of the most influential cognitive psychologists. He had a particular interest in epistemology – the nature of knowledge as well as biology. Piaget undertook many experiments on children and in his work concluded that 'human beings go though several distinct stages of cognitive development. Each stage involves the acquisition of new skills and rest upon the successful completion of the preceding one' (Kristinsdottir, 2001).

Cognitivists maintain that learning involves building mental pictures, plans or diagrams that are used to facilitate the processing of information. A child learns through experimentation and discovery (learn by doing). New or unfamiliar experiences alter the child's structure to accommodate these new experiences. The building up of new experience increases cognitive structures and increases

learning (Turner, 2005, p.26). Cognitivists believe that while the teacher may be in control of the learning, it is the learning environment, which encourages the child to discover information relevant to their own needs. Schoolwork needs to be designed to stimulate learning and encourage students to organise and process information in the most efficient way (Jordan, Carlile and Stack, 2008, p.48).

Cognitive theory can easily be applied to the classroom. The first stage is to identify what students know already, so that new learning can build on previous knowledge. Secondly, the concept of information processing can be used. Humans like computers, acquire information from the environment. It is then stored and retrieved when applicable to the current tasks. There is a limit on what can be stored and processed at any time (Anderson, no date). The role of the teacher or tutor is critical in organising and carrying out the delivery of new information, which is related to the students' existing memory thus facilitating learning. Finally, students should be encouraged to undertake active research (a reflective process of problem solving) with proper support by the teacher or tutor.

3.4.3 Constructivism

Constructivism is seen as a natural progression from cognitivism. Piaget viewed learning as the construction of one structure after another. Knowledge is developed, based on the learners' experiences and how they interact with their environment. New information is linked to previous experience and prior knowledge. It is an active process where new ideas (information) are constructed based on current/past knowledge (Jordan, Carlile and Stack, 2008, p.55).

The Russian psychologist Lev Vygotsky began to receive recognition for his work on social constructivism in the 1960s and 1970s (Jordan, Carlile and Stack, 2008, p.59). Vygotsky believed that children performed better when they worked with an adult or teacher rather than by themselves. His theory on the

Zone of Proximal Development (ZPD) identifies what can be achieved with appropriate support (General Teaching Council for England, 2006). With teacher assistance, Vygotsky believed that children could achieve more than by themselves. Turner (2005, p.28) referred to this type of support as a process of 'scaffolding', where the tutor would offer more support when the learner is struggling and less support as they become more competent. Vygotsky saw the development of language and the articulation of ideas as being at the core of a pupil's learning and development.

Jerome Bruner, an American psychologist, developed Piaget's ideas on active learning to present his own ideas on instruction and discovery learning. His work in America in the 1960's on the influential 'Man: A Course of Study' (MACOS) project sought to develop a curriculum based on behavioural sciences. Although traditionalists attacked the project, Bruner had influenced thinking amongst scholars. Bruner saw children as active problem solvers and his key text 'The Process of Education' identified four key themes that are central to the act of learning:

- The importance of structure
- Readiness for learning
- Intuitive and analytical thinking
- Motives for learning

The classroom is no longer a place where the teacher ('expert') pours knowledge into passive students, who wait like empty vessels to be filled. In the constructivist model, the students are urged to be actively involved in their own process of learning. The learning environment is 'student-centered, collaborative, co-operative, and experiential' (Akindanmi, 2008). The teacher takes on the role of facilitator and guides students through the learning process thus allowing them to develop and assess their own understanding, and subsequent learning (Seigel, 2004). Students become independent learners.

3.4.4 Humanism

The humanist approach to learning emerged through the work of Rogers and Maslow. The humanist movement believes that feeling good about oneself and deciding on ones own behaviour rather than reacting to the environment or external stimuli, is of paramount importance. The learner takes centre stage and has their own goals they wish to achieve (Brown, 2004, p.40). Huitt (2009) argues that it is necessary to study the whole person, a concept Rogers (1969) represented with his 'fully functioning person, which his theory described' (Glassman and Hadad, 2000, p.293).

Abraham Maslow, the American psychologist was a very influential person in the Humanist movement. 'Maslow learnt the application of the holistic approach to psychology from Max Wertheimer and Kurt Koffka, both prominent members of the Gestalt school' (Adair, 2006, p.49). His influential paper 'A Theory of Motivation' published by the Psychological Review in 1948, sought to present the idea that human actions are directed towards goal attainment. As an individual's needs are satisfied they will move onto the next more sophisticated stage (Maddock and Fulton, 1998, p.8). Maslow's five levels of needs are represented in a hierarchical pyramid as shown in Figure 3.1.

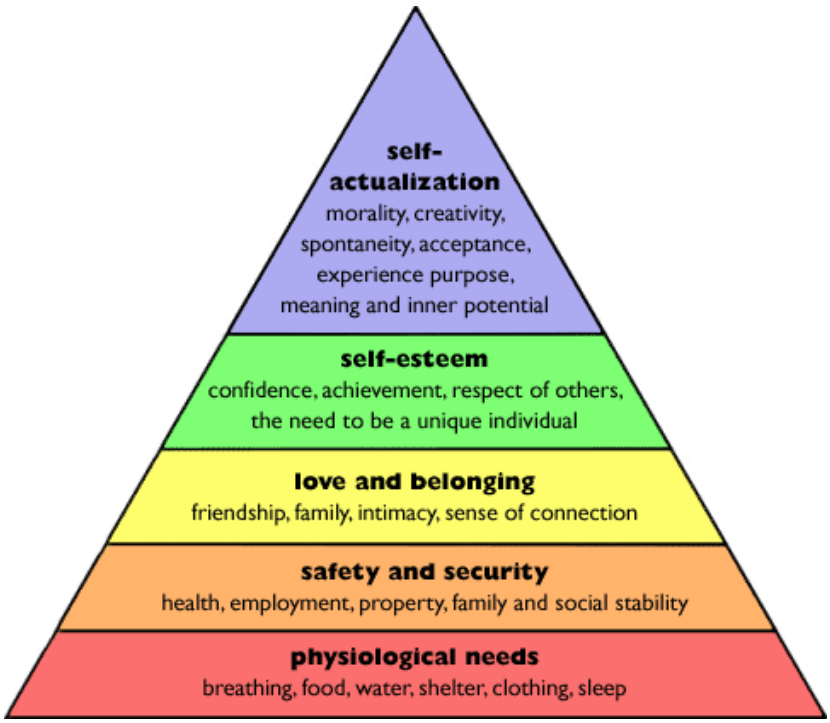


Figure 3.1: Maslow's Hierarchy of Needs (Source: Research History, 2012)

The broad base of the pyramid shows survival needs at the bottom and self-actualisation need at the narrower top (Gawel, 1997, p.3). Basic or deficiency needs (physiological, safety and security, love and belonging, and esteem) need to be met first before progressing onto growth needs (self-actualisation). The humanist movement believes that students, given the right conditions and opportunities for intellectual development, will flourish where 'the most significant learning involves changing one's concept of oneself' (Dunn, 2002, p.1). This is synonymous with students feeling good about themselves (self-actualisation). Brown (2004, p.40) is concerned that too much freedom early on in a student's life may not help them flourish but could give rise to anxiety leading to stress. The role of the teacher/tutor is vital in getting the balance right by giving students freedom to learn and having responsibility for their own learning, yet guiding them towards reaching their full potential.

3.5 Reflection and experiential learning models

Reflecting on one's experience is now an accepted way of learning new knowledge and skills in the workplace. The work of Donald Schön on 'reflective practice', which is at the heart of the understanding of what professionals do, emphasises the use of reflection in professional activities that have little structure or the outcome is uncertain (Moon, 2009, p.80). Schön developed the concepts of 'reflection-in-action' and 'reflection-on-action' and he believed in the usefulness of professional learning and development.

Professionals could use 'reflection-in-action' as a tool to improve their practice (Darling, 1998). It is about thinking again at new ways of tackling a problem and dealing with situations of uncertainty. Schön (1983, p.68) saw this process of 'thinking on ones feet' as a way of reflecting on the problem and prior understanding of the various issues surrounding it. This enables new understanding to be generated resulting in a change in the situation. 'Reflection-on-action' involves a retrospective examination of events (Jordan, Carlile and Stack, 2008, p.202). It enables us to explore what we did and why we did it. Future improvement will show learning from this experience has occurred. The work of Schön suggests support for work experience since professional competence cannot be solely taught in an academic setting (Turner, 2005, p.32).

Reflection plays an important role in the process of creating new knowledge and understanding from theory and practice. Structured processes of reflective activity in the curriculum have the potential to enhance academic and employability skills (Wardock, 2012). The term 'experiential learning' is used to describe a process of learning associated with the application of experience. The experiential learning cycle of Kolb (1984) illustrates that learning from experience takes place in four ways as shown in Figure 3.2.

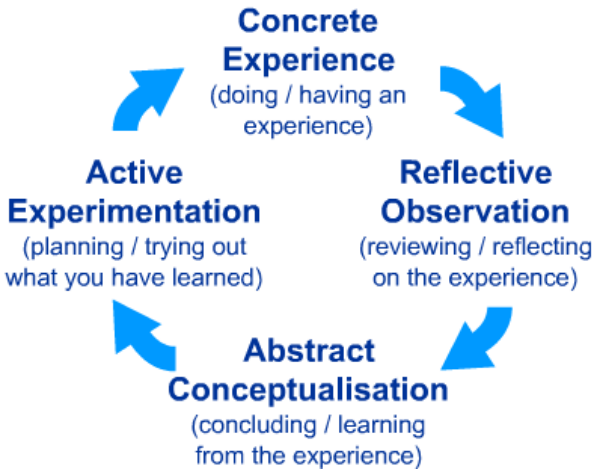


Figure 3.2 Kolb's learning cycle (Source: Davies, no date)

The cycle can be entered at any point, but all four stages must be followed in sequence for successful learning to take place. Learners tend to be stronger in one aspect of the cycle than another and therefore will have differing learning styles (Turner, 2005, p.30). A 'one size fits all' approach is not good teaching practice and variety provides the stimulus for learning. A good teacher will take account of individual student needs and preferences and provide learning opportunities that offer support through the experiential learning cycle (Turner, 2005, p.35).

Learning through experience is well documented, however the fact that it takes the form of a neat cycle as suggested by both Kolb (1984) and Honey and Munford (1986) is questionable. Learning is much more fragmented with learners jumping between elements in complex ways. Learning from experience is beyond question, however the level and depth of that learning is open to debate. Individuals need to exploit naturally occurring learning experiences, using group work, as an example (Cheetham and Chivers, 2001, pp.256-257).

3.6 How the learning theories and models relate to this research project

The previous sections have reviewed a range of learning themes that can be embedded in educational practice to promote teaching and learning activities that enhance students' learning.

The ***behaviourist theory*** (Section 3.4.1) operates on the principle of 'stimulus-response' with students taking responsibility for their own learning (Brown, 2004, p.13; Jordan, Carlile and Stack, 2008, p.31). With the development of a structured approach to PDP and WBL, students should be encouraged to become self-motivating and critical of their own learning. Any observed change, as a result of a positive experience through a study skills programme could enhance the students' ability to learn and apply knowledge in both an educational and workplace setting.

Cognitive theory (Section 3.4.2) is concerned with the way the human mind processes information leading to certain outcomes (Jordan, Carlile and Stack, 2008, p.36). The proposed research model could use cogitative theory techniques of discovery and assimilation of information by facilitating the students' learning and encouraging students through the personal development sessions to monitor their own learning through reflective practices. Cognitive approaches to learning encourage learning by doing and the practical application of theory may enable students to build on their previous knowledge.

Constructivist theory (Section 3.4.3) builds on the cognitive approach where students find out information for themselves with the tutor acting as a facilitator (Seigel, 2004; Jordan, Carlile and Stack, 2008, p.55). It is important to support and challenge the students' learning through an appropriate learning environment. The introduction of study skills could facilitate the students becoming independent learners. Since experience plays a key role in the constructivist approach this learning theory could be used in the development of a WBL curriculum that supports academic learning.

The ***humanist theory*** (Section 3.4.4) focuses on students having freedom to learn in their own way, having dignity and respect and being able to realise their potential (Brown, 2004, p.40). As part of the PDP/WBL model students should learn about ethical values and self-development as part of an employability skills package. Students should be encouraged to develop a career plan identifying what they can do (strengths) but where they need to improve (weaknesses) and how they intend to achieve that improvement and over what time period.

The central theme applied to ***reflection and experiential learning*** (Section 3.4.5) is reflective practice, which encourages the development of new knowledge and understanding (Wardock, 2012). Kolb's experiential learning model, which encourages learning from experience, could be an important part of the new model to enhance professional competence. Individual learning plans, monitored through a structured approach to personal tutoring offers the potential to support individual student needs.

3.7 What is knowledge?

Knowledge as defined in The Concise Oxford Dictionary (New Edition) is: *noun* **1 a** awareness or familiarity gained by experience. **b** a person's range of information. **2 a** a theoretical or practical understanding of a subject. **b** the sum of what is known. This definition covers the work of Gibbons et al. (1994) where they identified that there are two modes of knowledge: mode 1 and mode 2. Mode 1 or traditional as Gibbons *et al*. (1994, p.1) state is '… generated within a disciplinary, primary cognitive, context …' and '… Mode 1 problems are set and solved in a context governed by the, largely academic, interests of a specific community. … Mode 1 is hierarchical and tends to preserve its form … ' (Gibbons et al., 1994, p.3). This fits in well with the ethos at 'traditional universities', which have a greater research focus and spend a considerable

amount of time on theoretical arguments. The knowledge is explicit or codified and can easily be found in the literature.

The second mode of knowledge is mode 2 or transdisciplinarity. Gibbons *et al*. (1994, p.168) define it as 'Knowledge which emerges from a particular *context of application* with its own distinct theoretical structures, research methods and modes of practice but which may not be locatable on the prevailing disciplinary map'. Learning whilst working fits mode 2 or transdisciplinarity knowledge. Different work environments will generate different levels of knowledge production dependant upon the type of work carried out. The views of Gibbons et al. (1994) are supported by those of Taylor (2009) who provides a useful summary of mode 1 and mode 2 knowledge in Table 3.3.

Table 3.3: Characteristics of mode one and mode two knowledge (Source: Taylor, 2009, p.64)

Mode 1 knowledge	***Mode 2 knowledge***
Academic context	Produced in the context of application
Disciplinary knowledge	Transdisciplinary knowledge
Homogeneous characteristics	Heterogeneous characteristics
Hierarchical knowledge	Transient
Produced inside 'traditional universities'	More socially accountable
	More reflective
	Increasingly produced outside 'traditional' university settings

In its broadest sense, knowledge is seen as being of a theoretical base yet having a practical application, which covers many different facets of knowledge such as 'procedural, propositional, practical and tacit' (Eraut, 1994, p.16). Taylor (2009) groups these types of knowledge into: propositional, personal and process. Propositional sits closely with Gibbons et al. (1994) and their mode 1 knowledge. It is about theory and concepts, the type of knowledge covered in

traditional teaching at universities. Personal knowledge considers the impact that a learner's own experience has on their actions and process knowledge is about 'know how', linking theoretical or propositional knowledge with that gained from the work place (Taylor, 2009, p.67). Mode 2 knowledge is important for professionally recognised courses such as the BSc (Hons) Construction Management at Anglia Ruskin University as students are able to see the practical application of their work. Mode 2 knowledge could therefore be described as a career-based knowledge, which gives meaning and relevance to the students' learning.

3.8 How do students apply knowledge?

Section 3.4 identifies the main theories of learning. Behaviourists views, especially related to skills and competencies became influential in education in the early twentieth century (Jordan, Carlile and Stack, 2008, p.12). The American educationalist Benjamin Bloom along with a group of measurement specialists published in 1956, under the title 'Taxonomy of Educational Objectives' a framework specifying what is expected or intended for students to learn. According to Krathwohl (2002, p.213), Bloom saw the Taxonomy of Educational Objectives as much more than just a measurement tool. In fact, the main use according to Krathwohl (2002, p.213) 'has been to classify curricular objectives and test items in order to show the breadth, or lack of breadth, of the objectives and items across the spectrum of categories.' Bloom et al. (1956) Taxonomy of Learning identifies three types of learning behaviours:

- Cognitive: mental skills (knowledge)
- Affective: growth in feelings or emotional areas (attitude)
- Psychomotor: manual or physical skills (skills)

Bloom et al. (1956) cognitive Taxonomy of Learning involves knowledge and the development of intellectual skills. There are six different categories or levels

of learning which provide a sequential model for curriculum design. Figure 3.3 shows the six levels of Bloom's cognitive Taxonomy of Learning and Table 3.4, taken from Jordan, Carlile and Stack (2008, p. 28) identifies the behaviours associated with each category.

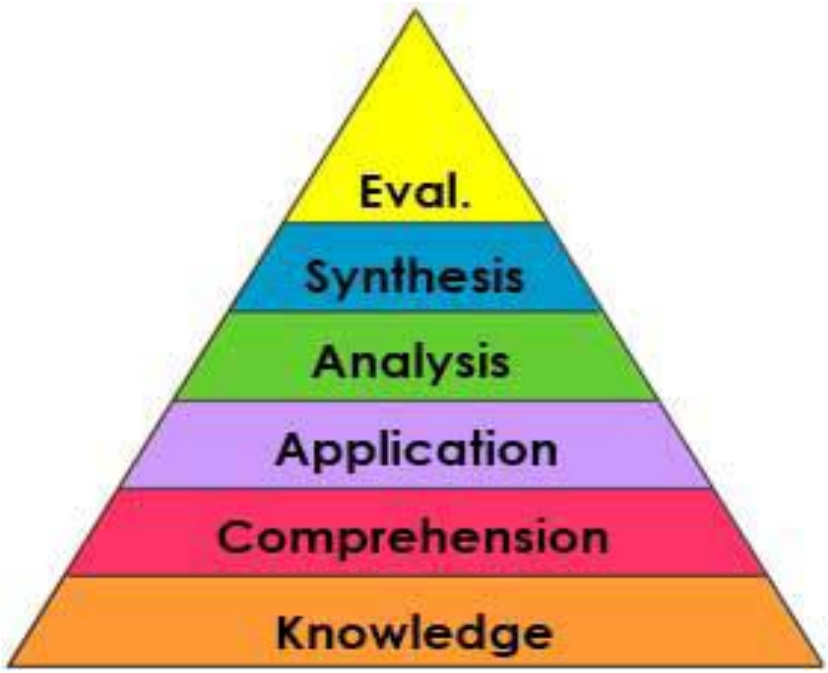


Figure 3.3: Bloom's cognitive Taxonomy of Learning (Source: Forehand, 2010, p.44)

Table 3.4: Bloom's cognitive domain (Source: Jordan, Carlile and Stack, 2008, p.28)

Levels	***Behaviours***
Evaluation	Appraising, discriminating, assessing, resolving
Synthesis	Summarising, generalising, integrating, constructing
Analysis	Breaking down, categorizing, comparing, contrasting
Application	Applying, transferring, employing, organizing
Comprehension	Paraphrasing, recognizing, illustrating, explaining
Knowledge	Outlying, recounting, defining, enumerating

The behaviours show a progression from basic subject knowledge up to the more complex level of evaluation and being able to evaluate or judge the worth of knowledge. The objectives should be seen as a continuum and not as independent items (Schmid, 1995, p.57). Krathwohl (2002) feels that the main emphasis has always been on recall of information (knowledge category) but the most important aspects of education involve the use and understanding of this information which is evident in higher level qualifications.

Mayer (2002, p.226) feels that the revised Taxonomy, developed by Anderson et al. (2001) is based 'on a broader vision of learning that includes not only acquiring knowledge but also being able to use knowledge in a variety of new situations.' This suggestion put forward by Mayer fits well with the work of Stacy (1996) and Stephenson (1995). As indicated in Chapter 2, the move from being competent to capable is based on ones ability to cope with unfamiliar tasks in an unfamiliar environment, or as Mayer states 'being able to use knowledge in a variety of situations' (Mayer, 2002, p.226).

Students develop and assimilate knowledge through the learning environment (education and training). It is retained immediately or through practical application (Schmid, 1995, p.60). Retention and transfer are seen as two important concepts in the acquisition of knowledge (Mayer, 2002, p.226). The way the material is presented or as Schmid (1995, p.60) indicates 'transmitted', clearly has an effect on retention of information. Cognitive theory supports this view with learning resulting from the learner organising and processing information effectively in a teacher led environment that encourages learning to take place. Once the material has been learnt, students need to be able to use or transfer the information to solve new problems, answer new questions or learn new subject matter (Mayer, 2002, p.226).

This process of 'knowing that' and 'knowing how' forms the basis of Dreyfus and Dreyfus (1980) skill acquisition model. The basic tools of learning skills and knowledge in an educational setting then being able to apply those skills and knowledge in a workplace setting to solve new problems is one of the key themes of WBL. This concept will be explored further in Chapter 4.

3.9 Chapter summary

Evidence from published literature suggests that learning involves a ‘change of behaviour’ however not all psychologists agree that a change of behaviour results from experience. The chapter indicates that the learning process involves either ‘doing’ or being ‘done to’. Depending on your philosophical view, this statement has many shades of being correct. The four theories of learning: behaviourism, cognitivism, constructivism and humanism, suggest that learning takes place in different ways and each one provides a contribution to the research project. The constructivist view suggests that students learn from experience and the design of the learning environment plays a significant role in the learning experience.

The chapter identifies the importance of reflecting on one’s experience and how this is now an accepted way of learning new knowledge and skills in the workplace. Gibbons et al. (1994) identify two types of knowledge: mode 1 (theoretical) and mode 2 (practical) whilst Mayer (2002) indicates that retention and transfer are two important concepts in acquiring knowledge. Mayer went on to add that students should not only be able to gain knowledge through a structured curriculum but should also be able to apply that knowledge to new situations. This application of knowledge could occur through WBL, which is the subject of the next chapter.

4.0 Work-based Learning (WBL)

4.1 Introduction to the chapter

The purpose of this chapter is to define what the term ‘work-based learning’ (WBL) means and why the concept of learning in the workplace has become part of the higher education agenda. The chapter considers the characteristics of a WBL curriculum and the four potential models of a WBL programme, suggested by Burns and Chisholm (2003) are evaluated. These are analysed in relation to the two models of WBL identified by Brown and Harte (2006).

The characteristics of a WBL curriculum identified by Boud and Solomon (2001) and Margaryan (2008) are developed into five key themes, which are discussed in relation to the model of WBL proposed by Raelin (1997). This section of the chapter has informed the questionnaire to built environment pathway leaders at UK universities offering a BSc Construction Management course.

The benefits of an integrated approach that prepares students for the workplace is also discussed and the merits of the Centre for Outcomes Based Education (COBE) generic WBL course framework are explored. The chapter moves to consider the importance of reflective practices in the workplace and identifies a set of enhanced employability skills and competencies, which are given to higher-level personnel and the focus groups for their opinion. The employability skills and competencies are mapped to COBE’s generic course framework for WBL and the results are discussed.

4.2 The concept of WBL

Learning in the workplace is not a new idea. Over the years, many in professional practice have developed their skills 'on the job' and shared them with others joining the workplace (Garnett and Workmann, 2009, p.2). This new constructivist approach to learning, which was discuss in Chapter 3, where new knowledge is developed, based on the learner demonstrating understanding by thinking and analysing the problem or situation is a move away from the behaviourist view where experience changes behaviour (Turner, 2005). During the 1970s and 1980s the first guises of work-based projects were seen in independent study modules being delivered in higher education. These fitted the humanistic model of education where individuals took responsibility for their own learning and how that learning could be achieved.

In the early 1990s, more generic modules and courses focussing on individual practice have grown and as such the boundary that knowledge plays between creator and user has become a little blurred. Mode 2 knowledge (knowledge emerging from application or through work) was the sole preserve of professional practice (Costley, Elliott and Gibbs, 2010) however it is now being developed within an academic setting through partnerships with industry. But what exactly is WBL and why has it now become important?

The definitions of WBL are varied, as are ways in which WBL is delivered and assessed. Brennan and Hemsworth (2007, p.4) define WBL as 'learning people do for, in and through work'. According to Boud and Solomon (2001, p.4) 'WBL is the term used to describe a class of university programmes bringing together universities and work organisations to create new learning opportunities in workplaces.' It is important that WBL is not confused with work placements, so for the purpose of this thesis the Department of Education and Sciences (DfES) definition stated in Hanney (2005, p.106) should apply:

'Work placement – an experience of work for a short duration, and Work-based Learning – a structured learning experience leading to accreditation'.

This learning experience integrates the knowledge and skills obtained in the classroom with those in the workplace (Crabtree, Frame and Coday, 2010). The work-based element, underpinned by theory from universities fits closely with employer need. The workplace is used to make the curriculum more relevant by bringing together theory and practice (Raelin, 1997). Billett (2004) takes this further with the concept that the workplace is the main source of obtaining knowledge relevant to work. The experience gained in the workplace provides a practical base on which to judge theory. Rainbird, Fuller and Munro (2004, p.3) suggest that working with experienced colleagues will enable knowledge transfer to happen more easily and more quickly as the knowledge is gained in the context to which it is applied.

Courses taught at Anglia Ruskin University in the Department of Engineering and the Built Environment are mainly taught by academic staff that have practiced in industry. The practical experience of these academics together with the integration of the relevant theory provides a useful match, thus enhancing the environment in which students study. The workplace is not the only place to obtain practical knowledge, as tutors are able through case studies, role-play and practical exercises to engage the students in learning.

With WBL there is a real opportunity to bring the two worlds of theory and practice together. As Raelin (2008, p.64) articulates 'Theory is often constructed by practitioners as impractical or as academic or ivory-towerish'. Practice on the other hand is viewed by academics as commonplace and lacking a theoretical basis. 'Theoreticians develop hypotheses, empiricists do theory-testing and practitioners apply the results' (Raelin, 2008, p.64). The challenge faced with any work-based curriculum is how the two diverse views can be brought together into an academic qualification that recognises the workplace as an environment for learning.

WBL is seen as an opportunity to meet the demand for higher skill development caused by the skill deficiencies and low levels of qualifications in the workforce (Leitch, 2006). It can play an important part in meeting the demand for reskilling and up skilling the workforce (CBI, 2013). The key drivers for change as identified by the Higher Education Academy (HEA) (2006, pp.9-11) are:

- 'Drive to improve skills and productivity
- Drive to increase the supply of science, technology, engineering and maths skills
- Drive to create and apply new knowledge
- Drive to maximise innovation, enterprise and creativity
- Drive to expand further and higher education
- Drive to reduce the reliance of public funding of higher education'.

As expected, the Higher Education Academy Centre for Education in the Built Environment (2009) supports this view, which sees WBL providing recognition for the skills and abilities of employees, developed in the workplace. Higher Education (HE) has become increasingly interested in WBL for those already in employment and sees it complimenting existing personal and professional development practice (Little and Brennan, 1996). The context and setting has an influence on the learning that takes place (Eraut, 2004).

WBL provides an opportunity to equip employees with the higher-level skills needed to gain a competitive advantage in today's global market by ensuring a closer relationship between academia and industry. It also allows for university students whilst studying for an undergraduate degree to enhance their skills. This is closely linked to the Government's employability agenda (Nicholls and Walsh, 2007). 'Embedding employability into the core of higher education will continue to be a key priority of Government, universities and colleges, and employers. This will bring both significant private and public benefit, demonstrating higher education's broader role in contributing to economic growth as well as its vital role in social and cultural development' (HEFCE, 2011, p.5). Smith and Chepelin (2009, p.3) add a note of caution with the distinction made between 'learning about work from learning to work'. Within the field of construction management, the former covers the broad concepts of building technology, applied management and associated subjects whereas the

latter covers the narrower skills and competencies needed to perform in a particular work environment.

At Anglia Ruskin University, the way WBL is organised and the extent to which industry is involved varies enormously. At one end of the spectrum, there are courses which bear little resemblance to traditional classroom based delivery and which develop as Boud and Solomon (2001, p.4) state 'new pedagogies for learning'. An example of this is the FdSc Construction Site Management course. At the other end, traditional delivery takes place. 'WBL remains a contested area, not least because it challenges the very essence of universities as the primary source of knowledge' (HEA, 2006, p.18).

There has been much written over the years on WBL and its increased attention could be down to what Nikolou-Walker and Garnett (2004, p.298) call a 'paradigm shift from an industrial to a knowledge society.' The knowing what, why, how and where indicates a thirst for knowledge and through WBL there is an opportunity to engage theory and practice together. The convention has been for theory (explicit knowledge) to take place first, usually in an academic setting and then experiential (tacit knowledge) from the workplace to be applied later. Theory may be introduced after the experience so that practice can be questioned (Raelin, 1997). Either way, linking theory, practice and again theory together utilises the importance of both knowledge bases working together and reinforces the concepts of Schön (1983) on 'reflection-in-action' and 'reflection-on-action', which he believed were useful in professional learning and development.

Within the Department of Engineering and the Built Environment at Anglia Ruskin University, the underpinning aim of WBL is to use the academic skills that are developed during attendance at university to support the professional practice that occurs in the workplace. Students develop both the specific skills related to their job role with more generic transferrable skills related to academic study. What is unclear, is how relevant these skills are and whether they can be used towards professional capability and responsibility. This will be explored in Chapter 7 through the interviews with higher-level personnel.

4.3 Characteristics of a WBL curriculum

WBL comes in many guises and it is a methodology that can be suited to different situations at different educational levels. Burns and Chisholm (2003, p.180) suggest there are four potential models defining a WBL programme.

Model 1 – based on a programme of study totally associated with activities in the workplace. An example of this is the DProf in the Faculty of Science and Technology at Anglia Ruskin University. Through a series of papers and a thesis, students will be expected to develop new knowledge but within the field of professional practice. 'In doing so they can make a significant contribution to the advancement of their profession' (ARU, 2012a).

A model totally associated with activities in the workplace presents several challenges, not least how academic recognition is given for the work-based activities. At the doctoral level, new knowledge should be generated and in a true work-based course should benefit the work organisation as well as the employees (students) field of professional practice. The workplace qualification sees mode 1 knowledge being applied as mode 2 knowledge in the workplace. A drawback of this work-based qualification is that there needs to be a learning agreement in place, which recognises the involvement of the company, the academic provider and the student.

Model 2 – The course may be a combination of taught modules and workplace activity. An example of this is the FdSc Construction qualification at Anglia Ruskin University. The course, as Burns and Chisholm (2003, p.180) emphasise sees 'the development of tacit knowledge based on the interpretation of explicit knowledge from the taught modules with experience gained from work-based activity'. This occurs through specific WBL and work related learning modules. The main drawback of this approach is around the timeliness of integration. Ideally students would apply the knowledge learnt in

an academic setting soon after it has taken place, however this is not always the case.

Model 3 – Activity in the workplace is recognised using this model. An example of this is the FdSc Construction Site Management course at Anglia Ruskin University developed in conjunction with the National Construction College. The qualification allows for recognition of accredited prior experiential learning (APEL) and involves both explicit and tacit knowledge to be developed through academic and work-based activity. The APEL process can be time-consuming and the employee may find it difficult to fully articulate their experience and how relevant it is in an academic setting. Guidance and support from the academic institution is vital in ensuring the employee's knowledge is not only relevant but also at the appropriate level.

Model 4 – This model sees the course structure adapted to suit the needs of students. This might be referred to as negotiated learning and usually involves core studies which all students take alongside their individual work-based projects. An example of this approach is given by Hatfield (2006, p.140) with her Practice Skills Development Modules, which use a 'pick and mix skills escalator approach from a bank of existing skills to inform module content and learning outcomes' (ibid). In designing a skill, the learner establishes the underpinning knowledge required to undertake the skill then identify criteria against which achievement of the skill could be measured. It is important that the learner when designing the skill indicates in the underpinning knowledge and performance criteria statements, the level at which the skill is being achieved. The learner also evaluates their experience of workplace skill development (Hatfield, 2006).

The use of skills which Hatfield (2006, p.142) describes as an 'aspect of the notion of competence' are key in the assessment of NVQs. Chapter 2 describes the skills and competencies needed for construction management in the context of National Occupational Standards (NOS). This is discussed in more detail later in this chapter in the context of the QAA Subject Benchmark

Statements, which are used for an honours degree in construction management.

The four models described by Burns and Chisholm (2003) can coexist within one HE institution, which offers undergraduate, postgraduate and research degrees. The models offer different structures, which can be used at different stages of an employee's career. Flexible delivery models of WBL can address social inclusion which supports the lifelong learning agenda associated with giving access to HE for underrepresented groups (Burns and Chisholm, 2003, p.182).

Brown and Harte (2006) identify two models of WBL that can be used to differentiate between level, ability and performance requirements of different sections of the nursing profession. The first model (known as affirmative) is used as part of a foundation degree to educate unqualified staff to become Assistant Practitioners. The model affirms through assessment opportunities that a series of pre-determined skills and competencies have been achieved. The assessment opportunities ensure that the learning, critical reflection and an individual's capability are measured.

The second model (known as transformative) supports the professional development of senior nurses by allowing them to identify new learning opportunities (not pre-determined by the learning provider, therefore individual), which can lead to high levels of decision-making. There is no timeframe on the use of this model; instead agreement is reached between the learner and employer. This model has similarity with Burns and Chisholm (2003) fourth model and the 'pick and mix skills escalator approach' suggested by Hatfield (2006). The learning is personal, developmental and as Burns and Chisholm imply, is carried out in negotiation with the learner.

'A key aspect of WBL is the attempt to build linkages between theory and practice …' (Glew and Elsworth, 2010, p.2) but to do so needs an understanding of the fundamental building blocks that form its construction. Raelin (1997, p.564) feels that there are two key aspects to the process of

WBL, 'theory and practice modes of learning, explicit and tacit forms of knowledge.' Raelin went onto develop a WBL model linking the types of knowledge with the forms of learning and introducing a level of activity (individual and collective) to the debate. At an individual level, the model is based on the work of Kolb (1984) and his learning style inventory and at a collective level; it is based on the work of Lave and Wenger (1991) and their community of practice research. A copy of the Raelin's model is reproduced in Figure 4.1.

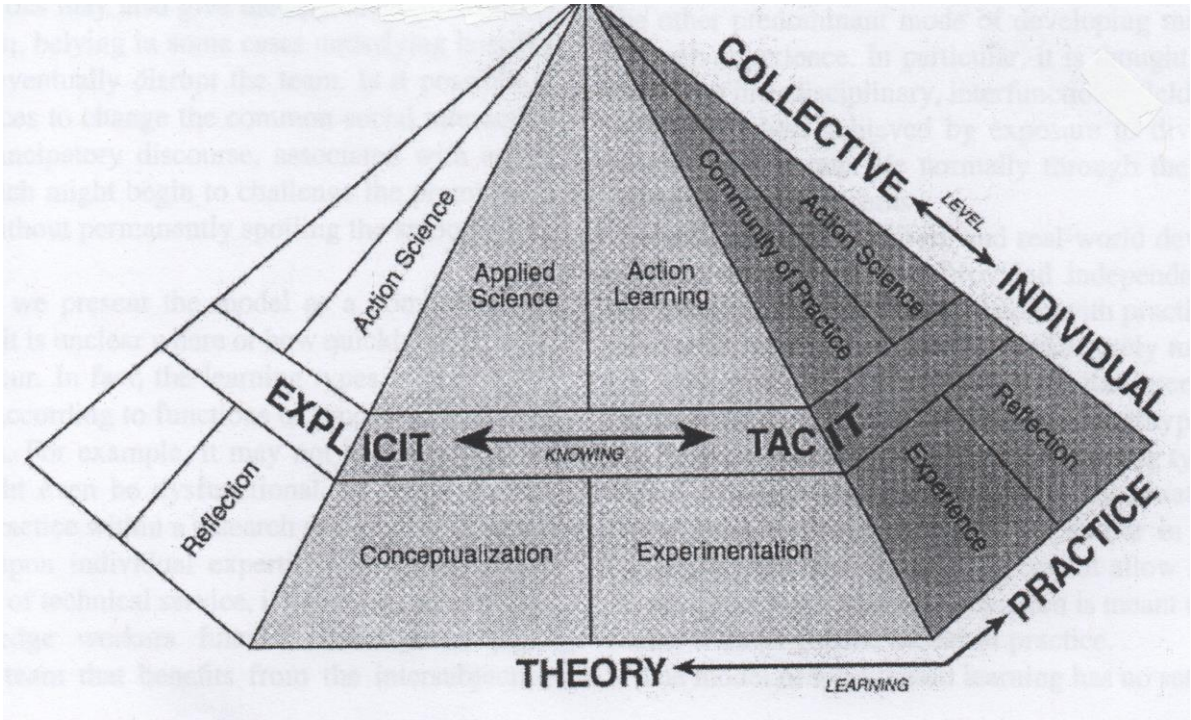


Figure 4.1: Raelin's model of WBL (Source: Raelin, 1997, p.573)

Raelin (1997, p.573) believes that to achieve 'proficiency and criticalness to their learning' each of the eight types of learning (individual level: conceptualization, experimentation, experience, reflection; collective level: applied science, action learning, community of practice, action science) needs to be present if that learning is to take place either by oneself or collectively with others. Reflective activity appears to be shown in the model only at an individual level. For reflection to be truly effective in a work-based context it needs to include others involved in the activity or affected by the activities

outcomes. Action learning, defined by Grey (1999, p.2) as 'the learning that arises from the process rather than (though inextricably linked to) the solution to an actual problem', offers the potential not only for the individual to review their own performance but also for others to provide constructive feedback. The formation of 'learning teams or action learning sets' (Raelin, 2007, p.569) within the workplace can facilitate the process.

The model also highlights community of practice as another potential area where reflective activity can enhance performance. Raelin (1997) sees a community of practice as a gathering of like-minded individuals with a common purpose, relying on each other for support. This community of practice can go beyond a work environment as students involved in WBL can engage as a group with a university's Virtual Learning Environment (VLE), social media or meet in person to share their experiences.

Raelin's model does not show how workplace learning occurs in practice. It is more of a theoretical approach than the application-based models supported by Burns and Chisholm (2003), and Brown and Harte (2006). Raelin's model does explore the link between theory and practice and make a brief reference to level, a concept at the heart of Burns and Chisholm's four models. The concepts highlighted by Raelin will be discussed later in the chapter in relation to the characteristics of a WBL curriculum identified by Margaryan (2008) and Boud and Solomon (2001).

There has been a paradigm shift away from the traditional approach of formal education with the teaching of conceptual knowledge (knowing-what and knowing-why) to a more informal setting of the workplace with the acquisition of procedural knowledge (knowing-how and knowing-where) (Margaryan, 2008, p.12). Traditionally a formal setting would be associated with an education course at college or university, such as a degree in construction management. This would usually be delivered in the classroom, facilitated by a tutor, with a set structure to the discovery of knowing-what and knowing-why. The informal setting of the workplace would centre on the individual's social group and their interaction with work colleagues. In addition to the four types of knowledge

(stated above), Margaryan (2008, p.13) identifies four key characteristics of WBL, which indicate that:

- it must be based on real world work-based problems,
- the emphasis of WBL is on project teams,
- it should be focussed on the individual, and
- it should be focussed on the process as well as the output.

Margaryan (2008, p.13)

These key characteristics focus on the informal setting of the workplace. There is no mention of third party involvement (with HE institutions) and little reference to other forms of knowledge other than work-based. Margaryan's characteristics appear inward looking rather than outward facing and only offer one view of WBL. On the other hand, Boud and Solomon (2001) indicate that WBL programmes share six characteristics along a continuum of HE and employer interaction. At one end of the spectrum, there is limited engagement with the workplace, yet at the other end there is substantial employer engagement, leading to new 'pedagogies for learning' (Boud and Solomon, 2001, p.4).

The six characteristics identified by Boud and Solomon (2001) are:

- in WBL a relationship exists between an education institution and an employer,
- work-based projects are being used,
- in WBL, learners are treated as individuals,
- the emphasise is that a WBL programme centres on the curriculum,
- in WBL, the learners starting point with regard to current competencies should be examined, and
- learning outcomes are important in a WBL course.

Boud and Solomon (2001, pp.4-7)

There is commonality between the two sets of characteristics (Margaryan, 2008; Boud and Solomon, 2001) leading to the development of the researcher's five key themes of a WBL curriculum, which will be analysed in relation to the model of WBL, proposed by Raelin (1997). These five themes include:

1. ***Relevance of the curriculum in meeting student/employer needs using work-based activities to facilitate learning***

Margaryan (2008, p.3) indicates that WBL must be based on real world work-based problems. For the learning to be meaningful and worthwhile the learning must be based on activities, tasks and problems within the learners' place of work. Raelin (1997, p.569) refers to this as 'action learning' where problems are real, not simulated and a period of debriefing (reflection) takes place. This links with the characteristic identified by Boud and Solomon (2001, p.6) on work-based projects being used. The projects provide a focus to the learning and are designed to extend the knowledge and skills of the learner as well as enhancing the work of the organisation.

WBL is also about active participation between the learner, workplace colleagues, peers on the course and the tutor. A workplace mentor offers support to the 'learner's growth and well-being' (Bailey, Hughes and Moore, p.177). The mentor/protégé relationship is important to help colleagues overcome difficulties and to provide valuable support when accelerating a young professional's career opportunities (Caldwell and Carter, 1993, p.12). The involvement of a mentor before, during and after the work placement has the potential to ensure a holistic approach rather than supervising only the placement activity. This articulates well with the characteristic identified by Boud and Solomon (2001, p.4). Firstly, a relationship exists between an education institution and an employer. This will enable the learning to be tailored to a particular need and make the learning more relevant to the individual. Learning takes place in a vocational setting and is true vocational education and training. The partnership allows the employer to have an input into the curriculum design, which gives the employer a sense of ownership knowing that they have contributed to the content. It is a requirement of many

professional bodies that HE institutions engage with employers and in the Department of Engineering and the Built Environment at Anglia Ruskin University; employers provide valuable critical comment on course design. Engaging with stakeholders is a fundamental part of WBL (Rainbird, Fuller and Munro, 2004). The employer also has an input into the day-to-day learning of the employee and this provides the employer with a structured setting for that learning to take place.

Margaryan (2008, p.13) suggests the emphasis of WBL should be on project teams. Poell and van der Krogt (2003) share this view and are keen to emphasise the importance of collaboration and working together in multi-disciplinary teams developing, enhancing and sharing knowledge. This suggestion implies that learning with colleagues in the workplace is key to enhancing the students' knowledge. As identified earlier, Raelin's model suggests using a community of practice to enhance collective learning. Knowledge is learnt through practice and the expansion of that knowledge is fed back to the workplace. Those involved within the 'community' benefit from one another (Raelin, 1997, p.570). The challenge in any work-based curriculum is how this learning can be monitored, checked to see it has occurred and how the students' knowledge can be assessed.

2. The curriculum needs to be flexible to recognise individual needs through an individual learning plan

Margaryan, (2008, p.3) indicates that the WBL must be focussed on the individual and is therefore a personalised experience. It is relevant to the individuals' current and future role at work. Boud and Solomon (2001, p.5) share this view and suggest that WBL needs to relate to learners as individuals. Raelin (1997, p.565) identifies 'WBL as an individual property'. This is different from the traditionalist view of institutions claiming that their students are independent yet they have little choice in what they study and the type of assessment involved (Willis, 2008). Each learner has their own work-based need, which changes over time and their requirements will not always fit into a standard course pattern. Through the WBL approach, learners are able to

develop their own individual learning plan, which is agreed between the learner, the employer and the education establishment. This tri-partite agreement provides a solid foundation, which suggests that the WBL programme can be successful.

3. The learning experience is key to achieving student/employer satisfaction

The final characteristic of WBL identified by Margaryan (2008, p.13) focuses on the process as well as the output. How the student achieves their goal is as important as the qualification itself. The WBL cycle of theory, practice, reflection and theory provides a means of integrating the four types of knowledge, as indicated by Margaryan. Boud and Solomon (2001, p.5) identify the importance of the process with the characteristic that emphasises a WBL programme centres on the curriculum. The education provider alone does not specify the learning but the workplace forms the boundaries of the curriculum. This means that the learning is very much contextualised, it tends to be organisation specific and in some organisations rather organic. The work-based learner moves from a 'consumer of knowledge to a producer of knowledge' (Tenant, 2000, cited in Smith and Chepelin, 2009, p.4). Raelin (1997, p.569) sees 'communities of practice evolving ' as individuals work together to achieve a common goal.

4. The learners starting point with regard to current competencies should be examined

Boud and Solomon (2001, p.6) extend the characteristics of WBL further by focusing on the learners starting point. They found that the student's previous background should be taken into account when they are offered a place on a WBL course. Their current competencies should be examined and mapped against units of study (modules). At Anglia Ruskin University a process of APEL exists and credit can be given for students' previous competencies from the workplace. The benefit of APEL is it recognises that a potential student may have acquired relevant university level knowledge elsewhere and does not

need to repeat the learning. The individual will need to provide adequate evidence to demonstrate that exemption can be given (Garnett and Workmann, 2009, p.5). This provides encouragement to the potential student that their prior experience has been recognised.

The drawback of APEL is that it is time consuming for both the individual and the tutor assessing the evidence. The potential student needs support to put their evidence together making sure it is fully described and complete. The tutor needs to satisfy University Regulations that the evidence is complete and at the appropriate level. The limitation of the traditional APEL process is learning is only recognised where there is close match with a validated course (Garnett, 2009, p.233).

5. Learning outcomes are important in a WBL course

The second additional point identified by Boud and Solomon (2001, p.6) considers the importance of learning outcomes. They should meet the national QAA standards with respect to the level of award. Students want a qualification that is recognised and as Boud and Solomon (2001, p. 6) state 'A framework of standard and levels which crosses the subject boundaries of education is needed because it will be rare for any given learning plan to fall exclusively within any given subject area and it is necessary to maintain standards across plans at a given level.'

The five key themes of a WBL curriculum have shown that there is 'a joint responsibility to support students in their acquisition ("learning-to-collect") of sufficient conceptual knowledge and in their engagement in social interaction processes ("learning-to-connect") to obtain knowledge and practical experiences at the workplace.' (Lappia, 2011, p.578).

WBL provides benefits for both the student and the employer. Appendix 4.1 identifies the potential benefits of a WBL programme for students and employers, which will be put to built environment pathway leaders at UK universities offering a BSc Construction Management course.

4.4 Creating a WBL curriculum that prepares students for the world of work

WBL covers many different educational practices from sandwich courses at undergraduate level, independent and negotiated study (undergraduate/postgraduate level) to accreditation of prior experience and learning (undergraduate/postgraduate level). It challenges the concept of a pre-determined curriculum but instead focuses on the individual and how they can develop their knowledge through employer and university engagement. This can cause problems though, if the curriculum is not set within a controlled framework of activity. As stated in Chapter 3, the UK Quality Code for Higher Education outlines the formal expectations that HE providers in the UK are required to meet (QAA, 2012a, p.1). The code also identifies what the general public can expect from an approved course. As a HE provider, universities need to maintain academic standards, so once a student reaches the minimum acceptable level (threshold standard), they will be eligible for an award. This ensures minimum standards across the UK are uniform (QAA, 2012c, pp.1-5). If no standards were in place, students would be unsure of the boundaries of their study, as they may perceive there is little structure to the qualification. Boundaries need to be set to maintain academic rigor and ensure the validity of assessment tasks. The curriculum should still be driven by the employer/educator relationship but within a pre-set framework.

Courses at universities have traditionally been set up on a credit system of points, which are related to module/unit size. At Anglia Ruskin University, courses consist of modules of 15 and 30 credits in value. Each module has a set of learning outcomes that a student must cover through the duration of the module. On traditional courses in the Department of Engineering and the Built Environment, the assessment tasks are pre-determined with all students undertaking the same tasks. In order to fit alongside other courses and units of

knowledge WBL programmes have mostly found it necessary to adopt an apparently similar structure (Boud and Solomon, 2001, p.44).

The workplace is the starting point for curriculum design. According to Boud and Solomon (2001, p.45) there are four factors, which must be considered. Firstly, the role the employees find themselves in will dictate the degree to which learning takes place as in many organisations, work pressures influence outside activity. Secondly and linked to the first factor, there are a range of students of different ages and backgrounds undertaking the course of study. Each has their own cultural background, knowledge and aspirations. The students' work environment places different demands, opportunities for learning and expectations on students.

Thirdly, it is important that courses are flexible, not only in the delivery method but also in way the curriculum responds to the different needs of the learners and their workplace. No two learners are the same and organisations and the work carried out by the workforce changes with time. Having a flexible course, with differing start dates and timing of modules goes against the traditional way university courses are structured. It becomes challenging and not cost effective to resource for small numbers of students.

Finally, workplace knowledge is constantly changing and the conventional curricular does not always reflect this change. Full time academics are by the nature of their position involved in academia and are not engaged in a full time capacity in industry. They are not exposed on a daily basis to the application of the knowledge they generate which can be questioned resulting in conflict between an academic's thoughts and those in the workplace. Work by Perera et al. (2013) found that there was a discrepancy between what academia sees as being relevant in quantity surveying education and what industry sees a graduate quantity surveyor needing for employment. The art of learning is about exposing students to different points of view but that process needs to be managed. A WBL course has the potential to provide a learner centred approach to the curriculum and in doing so ensuring it recognises the value of learning and knowledge in both a university and the workplace (Boud and

Solomon, 2001, pp.45-46). Perhaps the 'education versus training' debate highlighted by Perera et al. (2013, p.144) can be resolved to the mutual benefit of academia and industry.

In today's rapidly changing world, pressure is being applied on the traditional educational curricula containing abstract and theoretical knowledge (Peach, 2012). The joining together of theoretical and practical knowledge offers a new paradigm of knowledge that is 'centred upon use-value and application' (Peach, 2012, p.87). Symes and McIntyre (2000, p.1) refer to this as 'working knowledge'. It is knowledge that has a practical yet theoretical basis. The influx of this new type of knowledge has seen a change in the higher education landscape with more vocational and professional courses (Peach, 2012). This has resulted in an expansion of work related provision with the expectation that higher education recognise this paradigm shift and provide a curriculum that is not solely based on academic knowledge. WBL provides an opportunity for these 'non-traditional' students to engage with higher education but this could challenge the role of the traditional academic.

A true WBL curriculum differs from a traditional one. As Boud and Solomon (2001, p.48) state 'The work-based curriculum cannot be established in advance, for it will not be the same for all students, and it cannot be created exclusively by the education institution.' The central feature is engagement with the workplace and how the curriculum facilitates this process. The Centre for Outcomes-Based Education (COBE) has designed a generic course framework, which can be contextualized for WBL at first year undergraduate level. The research used to develop the framework was based on 'examining the different aspects of the working environment and by selecting the essential areas of relevance for all employees' (COBE, 2006). Appendix 4.2 presents the COBE framework and it covers health and safety, access to resources, legislation policy, and areas for workplace improvement and developing own learning (COBE, 2006). These are deemed vital components that students need to be aware of as part of a WBL curriculum. The themes identified in Appendix 4.2 will be considered later in the chapter, in relation to the specific

competencies produced by the CIOB for the Professional Development Programme and the Professional Review.

4.5 Using reflective practices in the WBL curriculum

Students need to know how to learn whether it be through social interaction, experience, from theory or through reflection (Lappia, 2011). This view is supported in the work conducted by Becher (1994), Davis (2003) and Letherby (2006) in which they intimate that today's students are not as academic as students of the past. Letherby (2006, p.251) suggests there is an increase in students entering HE who 'have low attention spans – able to 'txt' but not write a sentence, and Internet (but not library) savvy – and sometimes choose HE because of a lack of other choices'. To combat these deficiencies, higher education providers are focusing more on generic study skills and the development of employability skills in preparation for the world of work.

Reflective practices enable the learner to stop and think about what one has done, is doing or is about to do. Watton, Collings and Moon (2001) use the description given in the Harry Potter novel 'Harry Potter and The Goblet of Fire' to provide an ideal starting point with which to explain reflection. In the novel Dumbledore (Headmaster of the wizarding school Hogwarts) is having a conversation with Harry about having too many thoughts.

> 'Harry stared at the stone basin. The contents had returned to their original, silvery white state, swirling and rippling beneath his gaze.
>
> " What is it?" Harry asked shakily.
>
> "This? It is called a Pensive," said Dumbledore. " I sometimes find, and I am sure you know the feeling, that I simply have too many thoughts and memories crammed into my mind."
>
> "Err," said Harry who couldn't truthfully say that he had ever felt anything of the sort.

> “At these times” said Dumbledore, indicating the stone basin, “ I use the Pensive. One simply siphons the excess thoughts from one’s mind, pours them into a basin, and examines them at one’s leisure. It becomes easier to spot patterns and links, you understand, when they are in this form.’
>
> (Rowling, 2000, cited in Watton, Collings and Moon, 2001, p.3)

Whilst Rowling’s description is set in the context of wizardry, it does allow the reader to grasp the importance of reflection and to understand why so much has been written on the subject. Boud et al. (2006, p.194) provide a less fictional definition ‘Reflection is an assessment of how and why we have perceived, thought, felt and acted’. An enquiring mind leads to an understanding on the experience that may not have been evident in practice. Indeed, cognitive psychologists believe that reflection contributes to learning as much as having an experience (Raelin, 1997). Using reflective processes as part of the WBL experience enables the learner to see the workplace as a learning environment, which can be used to enhance their capability and performance (Graham, Rhodes and Shiel, 2006, p.172).

The current system used in the Department of Engineering and the Built Environment at Anglia Ruskin University has a rigid structure and there is little flexibility where students can be imaginative. The skills identified by the students have a similar context and there is limited variety in the evidence provided. A model which allows students to identify their own skill descriptors related to their area of professional practice has the potential to see a greater analytical and constructive synopsis of their learning achievements.

The paper presented by Costley and Armsby (2008) criticising WBL in higher education demonstrates that there are reservations in certain areas with the substance of WBL courses and module content. One of the concerns centres on the assessment of experience gained in work practices, which is not always subject/discipline specific. WBL by its very nature is transdisciplinary and does not sit in a single paradigm. ‘Where WBL is seen as lying outside the disciplines it can be viewed as a threat to existing systems’ (Costley and Armsby, 2008,

p.14). This statement suggests that for WBL to be meaningful and worthwhile it must be relevant to the course that the student is studying.

Courses taught at university, in vocational areas such as construction management must satisfy the relevant QAA Subject Benchmark Statements in Construction, Property and Surveying and as a professionally accredited course the CIOB (2013a) Education Framework. These two documents indicate quite clearly what is expected in terms of content and level for an honours degree in construction management and as Costley and Armsby (2008, p.14) indicate 'are likely to present obstacles and form boundaries to recognising first hand experiential learning because they are designed to assess specific learning taught on campus.'

Where WBL is based on generic learning outcomes that are directly related to professional practice, specialist subject based tutors find it difficult to make judgements if they are from a pure academic background. Costley and Armsby (2008) suggest that these 'academically focussed' tutors are specialists in theoretical knowledge and are comfortable in this area but do not have the practical expertise to judge the value of WBL and the way this unfamiliar knowledge is presented and hence its equivalence to academic work. There is still a feeling amongst the higher education sector that WBL has a pre-occupation with 'vocationalism' and as such higher-level approaches to knowledge and learning are not being met (Costley and Armsby, 2008, p.18). This negative view does not see the value WBL can bring and how through reflective and critical analysis higher-level skills can be achieved.

There is much written on the role of critical reflection in learning (Kolb, 1994; Schön, 1983) but little in the use of reflection in WBL. A study by McAlpine and Weston (2000, cited in Harvey et al., 2010) on reflection in experience-based learning revealed that reflective practice can lead to a change in knowledge gained from that experience however an increase in knowledge does not always see a change of behaviour. Perhaps the alternative view of Atherton (2009), which indicates that learning is not always about a change of behaviour, has enhanced credibility.

There are numerous ways in which reflective practice can be encouraged in a WBL environment that enable students to 'reflect upon their learning, to understand their own learning processes and thus to allow them to become more autonomous' (Stewart, no-date, p.1). Reflective practice allows the learner to identify how they can improve their performance in the workplace by giving them the opportunity to think for themselves and make decisions, which influence their learning thus creating autonomy and the opportunity to record progress. This enables the student to see the progress they have made beyond their current academic level, which further encourages increased performance, both at university and in professional practice.

Costley and Dikerdem (2011) see WBL as a form of practitioner learning, learning in practice (the workplace). Students need to continue to demonstrate practical competence in areas such as 'co-operation, critique, reflexivity, pragmatism and flexibility' (Costley and Dikerdem, 2011, p.18). WBL needs a reflective and evaluative approach and the use of self-assessment through these reflective practices is a good habit to grow (Helyer, 2010). The student needs to be aware of the concept of reflexivity. Whilst having its roots in research, the basic principle of being involved in an activity e.g. work placement means that reflective analysis of the activity may be influenced by pre-conceived ideas and/or experiences which may result in a biased account of the WBL experience.

Reflexivity is connected to actions and making sense of those actions. The process is used to describe how accounts of events, which took place, are constructed and to facilitate the process of knowledge development (Colombo, 2003, par.14). Students' reflective accounts have the potential to provide a rich discourse of deep learning. In WBL, students should be encouraged not only to describe their workplace experience but they need to describe their emotional responses as well (Bradley, 2011, p.49).

4.6: How the knowledge and skills that are developed as part of a structured WBL programme could be used towards professional capability and responsibility

If one is discussing WBL with a view to gaining experience in the workplace then part of that discussion should focus on the skills and competencies needed for employment. Chapter 2 discussed the skills and competencies needed for construction management and concluded that there are numerous ones required of a construction manager, however establishing an exact set are difficult. It is evident from the literature that the Dreyfus and Dreyfus (1980) model of skill acquisition, which is discussed in Chapter 2, can be used to assist with the process of identifying the knowledge and skills that would be needed to enhance professional capability and responsibility in the future. The model is based on the transposition of 'knowing that' and 'knowing how'. A novice should have the explicit knowledge mainly derived from theory but only through practice can this knowledge be related to the workplace. Through tacit knowledge the individuals' understanding of the task will become second nature (Dreyfus and Dreyfus, 1980). An expert has become independent and has developed the necessary levels of expertise to continually perform at this level.

The higher-level skills that Dreyfus and Dreyfus (1980) see as important cover problem solving, decision-making, working independently and having a vision. Within a qualification QAA expects all HE programmes to address:

- 'knowledge and understanding of the subject,
- intellectual skills such as analysis, synthesis, evaluation, and problem solving,
- practical skills need to be developed through opportunities to practice the activity in an appropriate learning context,
- transferable/key skills that is readily transferable to employment and other contexts, such as communication, teamwork and so on.'

(QAA, 2012c, p.10)

Courses in construction management 'should encourage students to develop personal and professional skills that broaden access to employment but at the

same time provide a broad-based education' (QAA, 2008, p.5). The Subject Benchmark Statements for honours degree students produced by QAA (2008) for Construction, Property and Surveying are set at two levels; threshold (minimum level of attainment) and typical (level expected of the majority of students). They cover three areas:

- Subject knowledge and understanding
- Subject specific skills
- Generic skills

In developing these skills, reference was made to the NOS, which were put together by the Construction Industry Council (CIC) and the relevant professional bodies, such as CIOB. These were discussed in Chapter 2 in relation to the skills and competencies needed for construction management. In 1997, a common set of learning outcomes covering higher education programmes in built environment was produced which have now been revised into two separate sets of outcomes. One covers Graduate Common Learning Outcomes (GCLO) and the other covers Intermediate Common Learning Outcomes (ICLO). Both these sets of outcomes identify the criteria (personal skills, technical and professional awareness) and benchmark standards against which new graduates in construction and built environment should be judged (CIC, 2012). Appendix 4.3 presents the GCLO for personal skills, technical knowledge and professional knowledge. The importance of having a set of common outcomes which all of the built environment can judge graduates, provides a useful benchmark in the combined drive to raise standards.

In addition, the Policy Forum for the Council for Industry and Higher Education (CIHE) (2004) identified the qualities or attitudes that should be present in individuals who have the ability to transform and add value to organisations early in their careers. The qualities or attitudes, as stated by Higher Education Academy Centre for Education in the Built Environment (2004) are based on the work of Harvey (2001) at the CIHE and cover:

- ***'Brainpower:*** The ability to identify and solve problems; work with information and handle a mass of diverse data, assess risk and draw conclusions.
- ***Generic Competencies:*** High level and transferable key skills such as the ability to work with others in a team, communicate, persuade and have interpersonal sensitivity.
- ***Personal Capabilities:*** The ability and desire to learn for oneself and improve one's self-awareness and performance. To be a self starter (creativity, decisiveness, initiative) and to finish the job (flexibility, adaptability, tolerance to stress).
- ***Subject Specific Knowledge:*** Depending on the job, not the most obvious and necessary in vocational areas.
- ***Technical Ability:*** For example, having the knowledge and experience of working with relevant modern laboratory equipment.'
  Higher Education Academy Centre for Education in the Built Environment (2004)

The areas to be addressed from QAA (2012c; 2008) on the Quality Code and Subject Benchmark Statements, the information from CIC (2012) on Graduate Common Learning Outcomes and the template presented by Higher Education Academy Centre for Education in the Built Environment (2004) for a Student Employability Profile can be summarised in Table 4.1.

Table 4.1: Summary of the areas to be addressed by higher education from QAA (2012c, 2008), CIC (2012) and the Higher Education Academy Centre for Education in the Built Environment (2004)

Source of data	Areas to be addressed by Higher Education
Quality Assurance Agency (QAA, 2012c, p.10) reference point known as 'The UK Quality Code for Higher Education'	Knowledge and understanding Intellectual skills Practical skills Transferable/key skills
Graduate Common Learning Outcomes (CIC, 2012)	Personal skills Technical knowledge Professional knowledge
The Subject Benchmark Statements for honours degree students produced by QAA (2008) for Construction, Property and Surveying	Subject knowledge and understanding Subject specific skills Generic skills
Higher Education Academy Centre for Education in the Built Environment (2004)	Brainpower Generic Competencies Personal Capabilities Subject Specific Knowledge Technical Ability

In order to become a professional in construction management (Member of the Chartered Institute of Building, MCIOB), potential applicants must demonstrate competence at both an academic level (normally through an accredited honours degree in construction management) and at a professional level through the CIOB (2013b) Professional Review process, which is the 'final stage to gaining

the CIOB Chartered qualification' (ibid). To be eligible for the CIOB Professional Review, candidates must have at least three years professional level experience or achieved the CIOB (2014a) Professional Development Programme.

The information in Table 4.1 can be combined with the key competencies taken from the CIOB (2013b) Professional Review process and the CIOB (2014a) Professional Development Programme to create a set of employability skills and competencies for built environment students. These are presented in Table 4.2 using the column headings: Technical and Professional Knowledge, Graduate Skills, Specific Career Competencies, Personal Attitudes and Attributes, which were developed around the areas being addressed in Table 4.1 and mapped against the QAA (2008) subject benchmark statements.

The set of employability skills and competencies for built environment students identified above can be listed in alphabetical order to establish an overall picture. These are presented in Table 4.3.

Table 4.2: Employability skills and competencies mapped against the QAA (2008) Subject Benchmark Statements

Subject Benchmark Statements for subject knowledge and understanding (Typical Standard)	Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) PDP and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
Recognize and anticipate the need for change in the relevant discipline and perceive future trends leading to the formation of informed questions		Questioning		Forward thinking
Describe and examine a range of key concepts and theoretical approaches and evaluate their effective application		Analysis Literacy skills		
Analyse the relative importance of relevant issues and their future application		Analysis	Innovation	
Evaluate and make judgments about all relevant aspects of management and other specialisms within the context of regulatory requirements, the needs of society and ethical correctness		Judgements	Professional judgement and responsibility Commitment to code of ethics	Integrity
Select and evaluate ICT applications appropriate to the discipline and evaluate and present original strategies to carry out a particular task	Construction related computer applications e.g. CAD, Project Management software	IT literate	Management information	
Analyse working relationships and interactions and evaluate their own strengths and weaknesses in a professional context.		Working with others Teamwork Inter-personal skills	Developing people or teams	Sensitivity Respect

Subject Benchmark Statements for subject specific skills (Typical Standard)	Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) PDP and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
Identify, survey, map and test relevant characteristics of the natural and built environment	Surveying Built environment Construction technology			
Analyse strategies and assess environmental sustainability	Sustainability	Analysis	Implementing sustainable construction and development Decision making	
Contribute to the development of organizational strategies and processes in a relevant industry	Strategic management		Leadership and strategic/financial management Decision making	Forward thinking
Identify and agree project requirements and coordinate the project development process	Management	Communication	Managing information Communication	
Investigate and assess factors affecting potential developments			Implementing sustainable construction and development	
Assess the financial and cost factors affecting development projects	Financial management	Numeracy skills	Leadership and strategic/financial management	
Develop, prepare and agree project designs and documentation	Contract administration		Leadership and strategic/financial management Managing health and safety	
Implement procurement and contract processes	Procurement Contract administration		Leadership and strategic/financial management	
Plan construction and installation operations	Planning and organising		Planning and organising work	
Control work and manage project completion	Monitoring and controlling		Planning and organising work Managing quality	
Determine the resolution of disputes	Law Contract administration Disputes		Knowledge of commercial, contractual and legal issues	
Value and assess built assets on the basis of a variety of relevant factors	Financial management			

Manage the process of property transactions and agreements	Contract administration			
Plan, control and manage the use and maintenance of property, systems and services	Planning and organising			
Investigate questions and problems of a non-routine and unfamiliar nature and devise solutions		Problem solving		
Manage teams and develop good working relationships and professional practice.		Teamwork	Personal effectiveness at work Developing people or teams	

Subject Benchmark Statements for generic skills (Typical Standard)	Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) PDP and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
Evaluate the appropriateness of various methods of knowledge acquisition and select appropriate research methods	Planning and organising	Analysis Decision making	Decision making	Decisiveness
Evaluate a range of sources, including current research, draw on evidence to reflect and evaluate competing explanations to draw appropriate conclusions	Information management	Literacy skills	Managing information	Reflectiveness
Select and evaluate strategies to encourage and improve leadership, interpersonal relations, group dynamics and self-development	Leadership	Timekeeping Teamwork Inter-personal skills	Personal effectiveness at work Commitment to CPD Develop people or teams	Responsibility Autonomy Presentable
Demonstrate an understanding of the short and long-term needs of businesses and other types of organisation	Business management	Awareness		Visionary
Select and use effectively a range of appropriate means of communication including information technology		Communication IT literate Literacy skills	Communication	
Make judgments of a non-routine nature in unfamiliar situations		Analysis Decision making Problem solving	Decision making Professional judgement and responsibility	Intuition Initiative

Table 4.3: 'Super suite of employability skills and competencies'

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
• Built Environment • Business management • Contract administration • Construction related computer applications • Construction technology • Disputes • Financial management • Information management • Law • Leadership • Management • Monitoring and controlling • Planning and organising • Procurement • Strategic management • Surveying • Sustainability	• Analysis • Communication • Decision making • Inter-personal skills • IT literate • Judgements • Literacy skills • Numeracy skills • Problem solving • Questioning • Teamwork • Timekeeping • Working with others	• Commitment to code of ethics • Commitment to CPD • Communication • Decision making • Developing people or teams • Implementing sustainable construction and development • Innovation • Knowledge of commercial, contractual and legal issues • Leadership and strategic/financial management • Managing information • Managing health and safety • Managing quality • Personal effectiveness at work • Planning and organising work • Professional judgement and responsibility	• Autonomy • Decisiveness • Forward thinking • Initiative • Integrity • Intuition • Presentable • Reflectiveness • Respect • Responsibility • Sensitivity • Visionary

To establish a comprehensive list of employability skills and competencies, the information in Table 4.3 is compared to the information within ARU (2011a) *Employment Strategy 2011-2014*, ARU (2011b) *Learning, Teaching and Assessment Strategy,* the University of Kent (2011) *Employability Skills Map* and the information from the four foundation degree projects, reported by Edwards (2009).

Within ARU (2011a) reference is made to the focus adopted by the Department for Education (DfEE) in 1998, that emphasises employability is more than a set of characteristics or assets that students should possess. As well as covering reflective skills, key skills, personal qualities, traditional intellectual skills and understanding how organisations work; students should develop their abilities 'in job searching and career management, and their skills in marketing and presenting themselves effectively through CVs, job interviews and whilst networking' (ARU, 2011a, p.8). The University's Employment Strategy also states the importance of the UK Commission for Employment and Skills and their definition in 2009 of employability skills, which cover seven key areas: Self-management, Teamworking, Business and customer awareness, Problem solving, Communication and literacy, Application of numeracy, Application of information technology. Underpinning all these attributes must be a positive attitude.

ARU (2011b, p.4) clearly states that the university will 'deliver a Learning, Teaching and Assessment experience that focuses on: … student employability (and) the experience is characterised through students: … possession of key employability skills'. This document identifies that the design and delivery of the university's curriculum will tackle the employability agenda. The University of Kent (2011) focuses on the importance of transferrable skills, personal skills and career management skills. The map recognises the main employability skills that employers look for in graduates and how these relate to each other.

The information in Table 2.4, Chapter 2 summarised the most common higher-level skills and knowledge areas employers and their representatives considered to be important for construction managers from the four foundation degree projects, as identified by Edwards (2009). Table 4.4 shows an enhanced set of employability skills and competencies for built environment students. The skills, and attitudes and attributes highlighted in yellow are additional to those given in Table 4.3.

Table 4.4: Enhanced 'super suite of employability skills and competencies'

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
• Built environment • Business management • Contract administration • Construction related computer applications • Construction technology • Disputes • Financial management • Information management • Law • Leadership • Management • Monitoring and controlling • Planning and organising • Procurement • Strategic management • Surveying • Sustainability	• Analysis • Communication • Decision making • Improving ones own performance • Inter-personal skills • IT literate • Judgements • Literacy skills • Numeracy skills • Problem solving • Questioning • Teamwork • Time management • Working with others	• Commitment to code of ethics • Commitment to CPD • Communication • Decision making • Developing people or teams • Implementing sustainable construction and development • Innovation • Knowledge of commercial, contractual and legal issues • Leadership and strategic/financial management • Managing information • Managing health and safety • Managing quality • Personal effectiveness at work • Planning and organising work • Professional judgement and responsibility	• Adaptability • Autonomy • Common-sense • Decisiveness • Forward thinking • Imaginative • Initiative • Integrity • Intuition • Presentable • Reflectiveness • Respect • Responsibility • Self-motivation • Sensitivity • Visionary

The information in Table 4.4 will be presented to higher-level personnel as part of the structured interviews to establish their opinions on the list and to make any amendments as appropriate. It is important that the views of experienced professionals working at the cutting edge of the construction industry are sought because these higher-level personnel have vast experience of working with

competent and capable personnel in the construction industry and are aware of the skills and competencies needed to perform at the highest level. Following the higher-level personnel interviews a revised list of enhanced employability skills and competencies will be compared with the skills and competencies shown on CSFs as identified by Anglia Ruskin University Built Environment Course Leaders (Appendix 4.4). Common themes that occur across the undergraduate courses are highlighted and colour coded. The results of this comparative exercise are discussed in Chapter 7.

The specific career competencies identified in Table 4.4 can also be mapped against the COBE's generic course framework for WBL at first year undergraduate level to check whether the information contained in each of the four blocks provides evidence towards the CIOB (2013b) Professional Review and the CIOB (2014a) Professional Development Programme. The information is presented in Appendix 4.5.

Of the fifteen specific career competencies identified by the CIOB, ten appear to be covered by the COBE's generic course framework for WBL at first year undergraduate level. This suggests that a structured approach to curriculum design that has links directly with a professional body's membership requirements is the way forward. However as Perera et al. (2013, p.158) point out 'There is no prescribed threshold benchmark standard for achieving competence at graduate level' (for RICS accredited courses). The research will explore whether the skills and competencies highlighted in Table 4.4 can be mapped to the different levels of an academic award.

The evidence presented in Tables 4.3 and 4.4 puts forward the argument that the academic knowledge that students achieve in a university might be reinforced in practice. The research suggests a link between academic knowledge and the skills needed for the workplace. Symes and McIntyre (2000) refer to this as 'working knowledge'. Research carried out by Stasz and Brewer (1998) at four different companies in the United States of America concluded that there is not always a match between the content and level of the learning and skills needed in the workplace. The research identifies that maths

and science based skills are expected in all of the workplaces sampled but 'the skills varied according to the job, the community of practice, and the work setting' (Hughes, Moore and Bailey, 1999, p.10). Students do not always appreciate the way they learn a particular skill in university can be applied in a different context in the workplace. As Hughes, Moore and Bailey (1999, p.10) state 'the academic skills were in a sense *hidden* in the work activity' suggesting that they may have been present but in a different form.

Research carried out by ConstructionSkills (2004) on the emerging skill gap between new and existing staff in the UK construction industry revealed that the lack of suitable technical and practical skills remains an issue. The research found that 30% of construction companies had a deficiency in this area amongst existing staff whilst 50% of new applicants joining the built environment professions lacked the required skills or competencies to do the job at a technical and practical level. The greatest skill gap with existing staff was in the areas of:

- Professional and general IT skills
- Management and customer handling skills

With new applicants, the perceived skill gap was in:

- Technical and practical skills
- Literacy skills
- Communication skills

This is offset against the perceived strengths of the construction industry, which are in the core skills relating to construction management, managing the construction team, construction methods and project completion (ConstructionSkills, 2004).

The Education and Skills Survey undertaken by the Confederation for British Industry (CBI) in 2011 reveals that employer satisfaction is greater with

graduates than with school/college students. Figure 4.2 shows the level of employer satisfaction with school/college students and Figure 4.3 shows the level of employer satisfaction with graduate's employability skills.

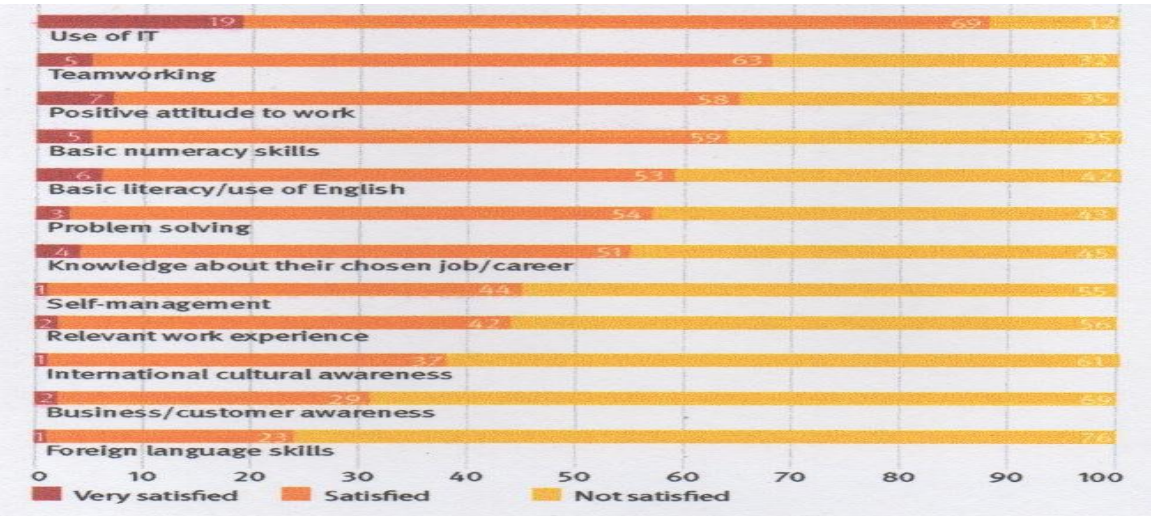


Figure 4.2: Employer satisfaction (%) with school/college leavers' employability skills (Source: CBI, 2011)

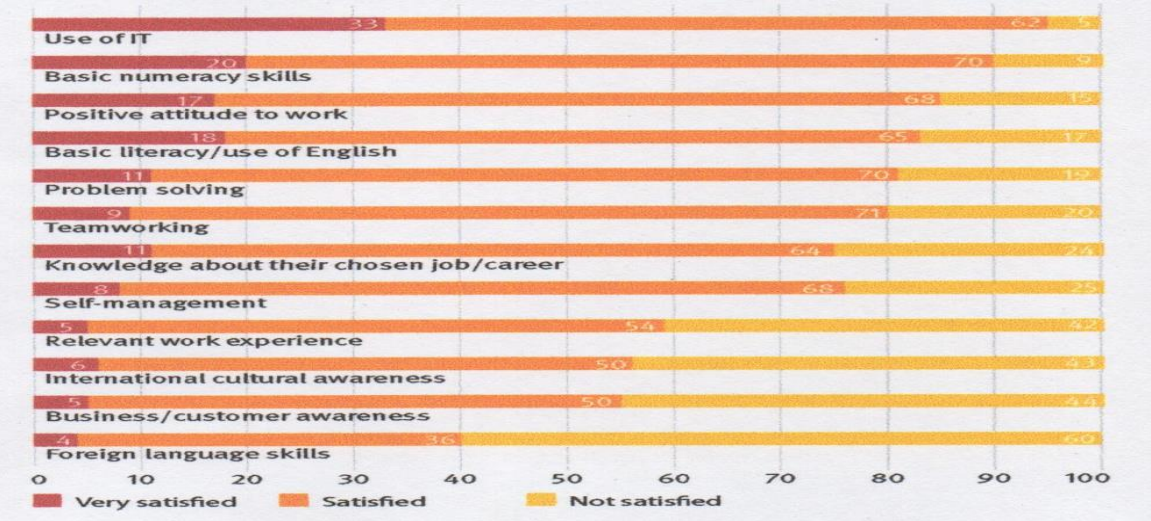


Figure 4.3: Employer satisfaction (%) with graduates' employability skills (Source: CBI, 2011)

The survey reveals that 'a quarter of employers in construction (24%) are not satisfied with graduates' problem solving skills' (CBI, 2011, p.24).

Approximately half of all employers (42%) feel that graduates are lacking work experience and nearly a quarter (24%) are concerned at the limited career awareness of graduates. This shows in the level of dissatisfaction from employers with 44% expressing concern at graduates' business and customer awareness skills (CBI, 2011). For the third successive year, the survey has highlighted the importance of employability skills with 82% of employers (Figure 4.4) looking for students to have these skills which 'include the ability to problem solve, work as part of a team and manage time effectively (CBI, 2011, p.38).

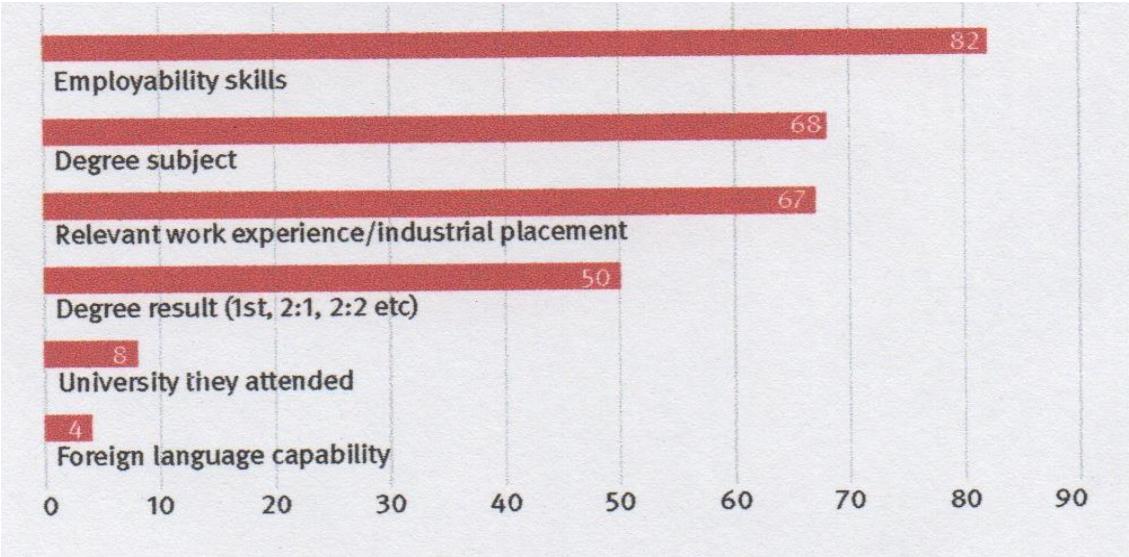


Figure 4.4: Most important factors (%) when recruiting graduates (Source: CBI, 2011)

The evidence suggests that higher education institutions should take employability skills extremely seriously but can these skills be taught solely within a university. WBL 'acknowledges that work practices are imbued with learning opportunities' (Peach, 2012, p.85). It links theory and workplace practice; knowledge with experience and provides students with the opportunity to develop employability skills that are not only relevant in the short term to gain permanent employment but also longer term in the pursuit of becoming an expert. A structured WBL curriculum based on the work of Margaryan (2008), Boud and Solomon (2001) and COBE (2006) that meets the requirements of

QAA (2012a, 2012b, 2002c, 2008) and CIC (2012) provides the basis of an integrated model of PDP and WBL that enhances traditional academic theory.

4.7 Chapter summary

Evidence from published literature (Brenham and Hemsworth, 2007; Brown and Harte, 2006; Hanney, 2005; Burns and Chisholm, 2003; Boud and Solomon, 2001) suggests that there are many definitions and ways in which WBL can be delivered and assessed. The changing HE agenda is driven by an increased demand for higher-level skills in the workplace and for university students to enhance their academic skills to meet the needs of employers. 'Employability' has become the buzzword of higher education with the ARU (2012b) *Corporate Plan 2011-2014*, ARU (2011a) *Employment Strategy 2011-2014* and ARU (2011b) *Learning, Teaching and Assessment Strategy* being the key internal drivers to meet the external expectations outlined in the Leitch (2006) *Review of Skills* which reinforced the need for basic and employability skills, and the UK Commission for Employment and Skills Report (2009, p.4) *The Employability Challenge* which set out a mandate to 'raise the status of employability skills, improve practice in developing them, and create a policy environment in which good practice flourishes'.

The chapter discussed the key characteristics of a WBL curriculum (Margaryan, 2008; Boud and Solomon, 2001) and identified five themes, which should be embedded in a WBL approach to curriculum design. The chapter went on to identify the importance of reflective practice in the workplace.

Research from published literature revealed a set of GCLOs applicable to construction and built environment students, which are based on the work of CIC (2012) and the relevant professional bodies. These outcomes and the Subject Benchmark Statements from QAA (2012a, 2012b, 20012c, 2008), the student employment profile produced by the HEA (2006), ARU (2011a), ARU (2011b) and the University of Kent (2011) were used to produce an enhanced

set of employability skills and competencies. These were compared to the CBI (2011) *Education and Skills Survey*, which revealed the importance employability skills, has with employers. Evidence suggests employers think these skills cannot be taught solely in an academic setting of a university and need to be integrated in the workplace through a period of WBL. The integration of employability skills alongside PDP and a structured programme of WBL in the curriculum may provide a model that supports the development of professional competencies and enhanced capability. This will be explored in Chapter 7.

5.0 Personal Development Planning (PDP)

5.1 Introduction to the chapter

The purpose of this chapter is to explore why PDP is seen as an important element of a higher education course. The ARU (2011a) Employment Strategy is discussed in the context of the requirements of the QAA. The work of Edwards (2005) in relation to that of Corkill (2006) provides an opportunity to develop a model at degree level for the delivery of PDP and WBL.

The role of professional skill development taken in relation to PDP and employment is discussed. Clegg and Bradley (2006) see PDP covering a diverse set of activities and skills but make the point that it should not solely cover skills for employment. The three Clegg and Bradley (2006) models of PDP practice are discussed in the context of the three modular components identified by Whitlock (2005). The key themes identified will seek to address through data collection, which model of PDP delivery would benefit students the most.

Finally the chapter considers the importance of PDP at Anglia Ruskin University in the Department of Engineering and the Built Environment in relation to academic success and future employment. The relevant goals in the ARU (2012b) Corporate Plan 2011 – 2014 are identified in relation to the University's employment strategy.

The chapter will inform the range of questions given to undergraduate final year built environment students and higher-level personnel. Students will be asked for their opinion on the different models of PDP delivery and skill development and higher-level personnel for their opinion on the benefits of PDP. The responses will inform the development of the integrated model of PDP and WBL.

5.2 What is PDP and why is it important?

According to QAA (2009, p.2), PDP is a 'structured and supported process undertaken by a learner to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development.' Cottrill (2010) and Wojtczak (2002) support the view and see PDP as the relationship between improving ones learning whether it is in an academic, personal or professional context and the plan on how it can be achieved. The focus of PDP is on the actions required to achieve the goals set.

A clear theme emerges from these statements. PDP is related to both academic study and the world of work. It provides an opportunity to get the student to think, in a reflective way what they would like to achieve in life, including their career and to put in place a 'road map' enabling them to plan their future. The ARU (2011a) Employment Strategy fully supports this vision and sets out what a student can expect from the university during their studies. There is a real emphasis on getting students to reflect holistically on their learning and extra-curricula activities, as well as encouraging students to think about their chosen career path and how their current skill set meets the challenges ahead.

The Dearing (1997) Report made reference to proposals for Higher Education Institutions (HEIs) to include students' PDP profiling in the curriculum. Students would be provided with the skills necessary to undertake reflective practices in relation to their academic study and personal and professional aspirations. Using the behaviourist's view that learning outcomes enhance the students' learning, then through PDP sessions students can identify and reflect on their learning. Some professions such as those in nursing and teaching include reflective practice as part of their core activity (Huntington and Moss, 2004, p.54). Time must be set aside for reflective skills to be developed in university. They need nourishing and as Gould and Taylor (1996, p.86) stress 'reflection must be grounded in the structure of the learning milieu'.

Reflection on learning is seen by Whitlock (2005) as the primary focus and is rated as one of the key features that is present in the best of the University of Westminster courses. Students need to develop their ability in judging their own performance and in doing so, monitoring their own performance (Boud and Lublin, 1983). There is still too much reliance on a teacher-led approach to learning and an over teaching of students in higher education (Humphreys, Greenan and McIlveen, 1997, p.68). The HE progress file provides an ideal opportunity to record the students' reflections and plans the students have for skill development and employability (Whitlock, 2005).

Edwards (2005) shares the view that PDP is an important aspect of university life that can be of maximum benefit to students when applying for jobs and career management in the world of work. Edward's research was sponsored by QAA and it focused on the development of progress files in higher education. Edwards identified ways in which PDP can be connected to employer needs and hence the world of work. The majority of employers surveyed placed a strong emphasis on the process of PDP rather than the outcomes in terms of a PDP file. 'Employers are keen to know not only that graduates have a particular skill and can prove it, but also that they can apply that skill in different contexts and provide evidence for using the skill in a variety of different situations' (Whitlock, 2005, p.2).

One of the areas of Edwards (2005) research was the relationship between PDP and graduate application forms. The research concluded that the application forms generally included a significant number of 'open' questions related to the students' experiences and achievements. The application forms also requested information from the students on their career aspirations and knowledge of the employer's business. PDP activities should include a strong emphasis on ensuring students effectively market themselves, the importance of academic and non-academic activity, and critical reflection which focuses on student competencies and career aspirations.

As well as involving employers in his research Edwards (2005, p.7) included Professional Bodies. The research concluded that 'Professional Bodies also

unanimously welcome the concept of introducing PDP skills in the student years'. The research provided the following conclusions:

- PDP could be usefully used to prepare students for job applications and subsequent interviews.
- PDP should cover both academic and non-academic activities.
- PDP should cover both individual and group activities and include reflective practices.
- PDP should highlight and include activities that emphasise the longer-term benefits in relation to 'life skills' for career management and professional accountability.
- The process of PDP is important as it adds value by helping students reflect on their experiences and improve their ability to articulate and demonstrate competence.

Edwards (2005, pp.4-9)

Corkill (2006) identified research that had been carried out on the relationship between WBL and PDP within a foundation degree curriculum. Her research focussed on forty-nine programmes in seven universities or partner colleges. Of the programmes identified only 33% were generally work-based with only 25% of these programmes having PDP embedded in the curriculum. Corkill (2006, p.33) states 'The findings were from a small-scale piece of research and that it may in no way be representative of what is happening in Foundation Degrees'. The conclusions drawn from Corkill's research suggest there is uncertainty as to what PDP entails, confusion as to how it relates in any meaningful way to WBL but employers must be engaged in the process.

There is an opportunity to utilise the work of Edwards (2005) and to develop the work of Corkill (2006) and produce a model for the delivery of PDP and WBL in the built environment that extends to honours degree level. By integrating PDP into the curriculum, students could feel confident that the full range of enhanced employability skills and competencies identified in Chapter 4 and expanded in

Chapter 7 have been introduced. This would have the potential to add value to their studies and provide a platform for employment in the workplace.

Students need to be challenged 'to explore the implications of the knowledge that they are acquiring and its relevance to their own personal and professional journey towards professional competence' (Huntington and Moss, 2004, p.57). This reflective approach can be facilitated through the PDP sessions but supported by the personal tutor role. The use of reflective narratives on skills and competencies should be embedded within the students' academic programme. The best approach can be achieved by making PDP the central theme of the course of study (Whitlock, 2005). The HEA (2012, p.8) extols the virtues of PDP tools and career advice, which are used in 'making connections between their career intentions and their learning, working, co-curricular and extra-curricular activities'. The development of an integrated model will see PDP activities as a vital element in which students will develop their employment prospects through structured study skill activities.

5.3 What is professional skill development?

The development of skills is seen as an important element through which to increase quality, service levels and productivity in the workforce. It is valuable for individuals to increase their ability and essential for the economy to remain healthy. Individuals acquire skills in many different ways from enrolling on training courses to carrying out on the job training to developing these skills through formal education (Grugulis, 2007; Brown, 2009).

Wilcox (2003, p.6) defines professional development skills 'as the ability of the learner, fluently and without external direction, to:

- audit and assess what they already know and can do
- work out, at a level of detail that will differ from individual to individual, a career and a learning development plan
- integrate, into their learning, acknowledgement of their need for continuing personal development in the private as well as the

professional realms

- understand the qualities of different kinds of knowing, of understanding, and of skills and competences and understand how the different kinds of knowledge inter-relate and reinforce each other
- reflect upon their knowledge, establishing links between different kinds of knowledge, and formulating relevant theoretical constructs to explain it
- conduct research into elements of professional knowledge, practice and competence that lie within the context of their work, in pursuit of solutions to problems of the day, personal professional development, and (more generally) the development of their profession.'

Wilcox (2003, p.6)

The list is comprehensive but as Wilcox (2003) suggests there needs to be a route on how these skills may be implemented. This problem is one of many challenges facing the development of an integrated model of personal developing planning and WBL. It is all very well designing the content but an implantation strategy needs to be produced. Chapter 7 explores the development and content of the model and how it may be implemented through a Graduate Skills Framework for Construction Management.

Professional skill development is not seen as a separate entity but can be found in universities through the process of PDP. Indeed, Clegg and Bradley (2006) identify 'professional' as one of three PDP models. Professional skill development is not a product or an outcome but a process. Students should develop their self-awareness, increase their personal effectiveness and acquire skills for the workplace in readiness for work, but measuring it can be difficult. Clegg and Bradley (2006) and Whitlock (2005) see the use of a portfolio of evidence through which competence and achievement can be measured as a useful model.

In the workplace professional skills development should be seen as the development of the skills necessary to perform in both the current and future job roles. Wilcox (2003, p.6) sees professional development as 'the process by which a person maintains the quality and relevance of professional services throughout his/her working life.' Professionals must develop their skills as they move through the levels from novice to expert as reinforced by Dreyfus and Dreyfus (1980) through their skill acquisition model. Brown (2009, p.10) feels

that ‘developing higher levels of skills, knowledge and understanding at work means engaging with a substantive knowledge base: prior to starting work, while working, through career development activities away from work, or through a combination of all three.’ The introduction of workplace learning into the model will enhance the opportunity to develop and implement these higher-level skills.

Challenging work can be a major form of skills development at any stage of ones working life. Brown (2009) shares this view and feels that the learning environment plays an important role in skills development. The environment might be right but as the saying goes ’you can lead a horse to water but you cannot make it drink’. Developing oneself is dependent upon individual actions. The goals and expectations set by individuals varies, as does the level of commitment and motivation.

5.4 How can PDP and professional skill development be captured in university?

According to Edwards (2005, p.6) in relation to competence frameworks and competence indicators, it is important in PDP activities that students reflect upon and develop understanding of the following areas:

- which competencies they have
- how they have obtained them
- which indicators they can quote to evidence the competencies
- how to highlight the impact of the competencies
- how they might be applied and evidenced in new situations
- how to develop or enhance competencies

There are many distinct practices of implementing PDP across HEIs with the key driver being the academic and professional development of the student (Clegg and Bradley, 2006). PDP should allow the student to reflect on his or

her own learning and development through a structured and supportive process, and should go beyond evidence collection. It should be seen as a stepping-stone, which leads to continuing professional development (CPD) as part of the lifelong learning agenda. The use of an e-portfolio could provide the support students need for skill development, reflection and career planning (Whitlock, 2005). Clegg and Bradley (2006, p.60) see PDP covering 'a range of activities involving reflection, personal target setting and planning, monitoring, evaluation, decision-making and career management'. These areas will be considered in the model and evidenced through the student's learning log.

PDP is seen as fitting nicely into the Government's employability agenda, however as Clegg and Bradley (2006, p.60) point out 'there is considerable debate about employability and whether its focus is purely on the development of skills required by employers from graduates, and the extent to which it fits with the broader lifelong learning agenda.' The views of higher-level personnel in the construction industry will be sought on the types of employability skills and competencies needed by graduates in the construction industry. Should employability skills cover only the specific skills needed for a particular career or should they cover the wider generic skills and transferable skills needed for a range of careers? This question will be explored further in the thesis through higher-level personnel interviews and a student questionnaire to final year built environment students at Anglia Ruskin University.

Work carried out by Clegg and Bradley in 2003 at their own institution, Sheffield Hallam University found many different examples of PDP being introduced into the curriculum. Through their research, Clegg and Bradley (2006) are able to create three models or types of personal development practice: professional, employment and academic. Professional PDP practice emphasises the importance of the professional body, a view highlighted by Edwards (2005) in his research on progress files, and the development of specific professional competencies associated with employability in an appropriate field. Tutors at Sheffield Hallam University who are categorised in this area of practice, feel that 'the purpose of the personal development plan or professional development portfolio is for them (students) to bring together their achievements during the

three years, or one year, and also to set targets, create an action plan and reflect on their progress towards those targets ‘ (Clegg and Bradley, 2006, p.66).

The model being proposed in the Department of Engineering and the Built Environment at Anglia Ruskin University sees a portfolio or learning log as an example of good practice that students develop over their course. The creation of a career action plan with milestones to success, reviewed through reflective practice should support the student’s development. The learning log approach will form part of a Graduate Skills Framework for Construction Management, which is discussed in Chapter 7.

Professional Bodies also play a key role within the Department of Engineering and the Built Environment at Anglia Ruskin University by accrediting the curriculum and making sure it meets the needs of that professional. The BSc (Hons) Construction Management course provides an example of professional body engagement and approval of a course. The CIOB provides strict criteria through the Education Framework, against which the learning outcomes of the course should be mapped. Students studying the course at Anglia Ruskin University will cover modules, which relate to the CIOB criteria. On successful completion of the course graduates will have met the academic criteria for professional membership. A minimum of three years professional experience will then lead to the Professional Review, which in turn leads to membership of CIOB. The proposed integrated model of PDP and WBL is aiming to challenge the length of professional experience required by CIOB after graduation.

The second model identified by Clegg and Bradley (2006) is ‘employment’. PDP should prepare the students for employment whether that is in a general or specific area. Recent feedback from students in the Department of Engineering and the Built Environment at Anglia Ruskin University via the Student Experience Survey (SES) in 2013, suggests that only 57% of students surveyed feel that the department’s courses are preparing them for employment. This figure appears rather low, as all built environment courses are vocational and taught by academics staff, 71% of whom are professionally qualified in a

relevant built environment area. A questionnaire to built environment final year students on their experience of PDP and why they feel their course does not prepare them for employment will be undertaken as part of the data collection for this thesis. The results of the questionnaire will be discussed in Chapter 7 in relation to the SES result.

The final model which Clegg and Bradley (2006) identify is 'academic' which focuses on the academic development of the students and covers 'metacompetencies' as described by Cheetham and Chivers (1998) in addition subject specific skills. The skills developed are those, which are relevant for higher education to enable the student to become an autonomous learner. Appendix 5.1 provides a summary of the main findings of Clegg and Bradley's research related to the three PDP models. Sheffield Hallam University staff feels that any system for recording PDP should have flexibility. A common framework may be used but it needs to be tailored to the specific student needs.

Clegg and Bradley (2006) do not insist that the three discrete models are not interconnected. Students are supported throughout all of the models, the emphasis on each being slightly different. In vocational areas such as construction management at Anglia Ruskin University, splitting PDP into three areas appears to be too simplistic. There is real overlap, especially between the professional and employability models. Students studying the CIOB accredited course are not only preparing themselves for employment but also for becoming a professional construction manager. It can be argued that there are different levels of how PDP can be divided up and how much of each area is covered. In vocational areas the professional and employment models are closely related with the academic providing a supporting role, but in non-vocational areas, the three separate models may exist with greater emphasis placed on the academic model.

The work of Whitlock (2005) indicates that PDP is developed through three modular components.

1. Curriculum – embedded skills and employability components found within the course modules. The academic curriculum provides an opportunity for reflective practice to be developed.
2. Specific PDP module(s)/academic and personal tutorials – additional non-subject specific support provided.
3. Portfolio development – used to support reflection and action planning.

The process of PDP is evident in 1 and 2 above with a portfolio being the outcome of such activity. Whitlock's three components are evident in the three models identified by Clegg and Bradley (2006). The 'professional model' identifies the importance of physical evidence through a portfolio and the development of this evidence through a specific skills module. Reflection is seen as a key component in the development of the student. The 'Employment model' focuses on the development of transferable skills and suggests these are developed through a skills module whereas Whitlock feels these should be embedded in the curriculum. The 'academic model' believes the student needs to develop skills relevant to their degree/discipline. Whitlock (2005) sees this happening through the curriculum component.

Clegg and Bradley (2006) and Whitlock (2005) agree on the importance of personal development and there is similarity on how it should be covered but no definitive method emerges. The extent to which Clegg and Bradley's three models and Whitlock's three components are evident in the Department of Engineering and the Built Environment at Anglia Ruskin University will be explored later in the thesis through the following question (Table 5.1) to final year built environment students.

Table 5.1: Models of PDP delivery

Which of the following models of Personal Development Planning (PDP) delivery would benefit you the most? (Source: Whitlock, 2005)		
Model	*PDP delivery*	*Please tick (one only)*
A	*Embedded skills and extra-modular tutorial support. Within this model skills and employability are embedded within the subject specific modules.*	
B	*Embedded skills, stand-a-lone PDP module and extra-modular support. PDP is delivered formally, usually by a single course module, normally in year 1 (level 4) of the course.*	
C	*Embedded skills with multi-level PDP modules. PDP is delivered, assessed and supported entirely within the course using stand-a-lone modules at each level (level 4, 5 and 6).*	

5.5 Importance of PDP at Anglia Ruskin University in relation to academic success and future employability

The key driver for implementation of PDP into the curriculum at Anglia Ruskin University is the ARU (2012b) Corporate Plan 2012 – 2014, which influences the ARU (2011a) Employability Strategy 2011 – 2014 and the ARU (2011b) Learning, Teaching and Assessment Strategy 2011 – 2014. Two of the Corporate Plan goals emphasise the ethos of PDP and why it is seen as being important to the development and success of the students.

Goal 1 – More than 90% of our students will succeed, be satisfied, and will recommend us to a friend.

Through the personal tutoring system, students will identify their own degree classification goal and have their progress monitored to ensure that they are kept on track to be successful. Students regularly discuss their progress with their personal tutor and any concerns can be taken forward and hopefully resolved with the course leader.

Goal 2 – The Destination of Leavers from Higher Education (DLHE) Survey will report that 95% of students are in work or further study six months after leaving us; our graduates' earnings will match average graduate earnings; and 7% of students will leave us to start their own businesses.

Achieving employment or being in further study is a key criterion of success. Students are supported to achieve their full potential by developing their employability skills and incorporating them into individual learning plans. The university's Employability Strategy echoes this theme 'A persons employability depends on a combination of their own skills, understandings, and attributes, and external influencing factors …' (ARU, 2011a, p.3). The Employability Strategy goes on to say that 'Our students will have developed a range of abilities and skills which will enhance their employability, in terms of both obtaining initial employment and developing their careers throughout their working life' (ARU, 2011a, p.10). Students are encouraged throughout PDP to reflect on the career of their choice and to identify strengths, weaknesses and skill gaps and to seek opportunities for further development. The model being proposed in this thesis will see students develop and undertake this type of work.

One key theme of goal 2 above is the building of employer links. Embedding WBL into the curriculum through structured work placements or internships should enhance the employability prospects of the students. The development

of an integrated model of PDP and WBL to enhance traditional academic theory has the potential to contribute to the achievement of the university's corporate goal.

Within the university there is no one employability strategy and no set PDP framework that is applicable across every course and every discipline. A 'one size fits all' approach is not deemed the most appropriate way forward. The university's Employability Strategy supports students in developing responsibility over their personal, professional and academic development and raises their awareness of the importance of reflective work experience (ARU, 2011a). The emphasis within the university's Learning, Teaching and Assessment Strategy is on student employability, characterised through students acquiring key employability skills.

Evidence from the pilot study identified in Chapter 1 revealed that 59% of construction management students felt that they did not learn anything new in the PDP sessions and 71% would like to see a different approach to its delivery. Evidence from ARU (2012b), ARU (2011a) and ARU (2011b), indicate the importance PDP plays in the development and success of students. The key themes of a structured approach to the implementation of PDP, enhancing the knowledge curricula with extra-curricular activities, the development of academic skills thus producing students with an employability skills set in readiness for employment, are at the heart of the university's Employment Strategy and Learning, Teaching and Assessment Strategy. The proposed integrated model being developed through a literature review and empirical evidence has taken best practice to identify a structured approach to the implementation of PDP and WBL to enhance traditional academic theory.

5.6 Chapter summary

The principles identified in this chapter will be explored further through the use of a questionnaire to undergraduate final year students in the Department of Engineering and the Built Environment at Anglia Ruskin University. Evidence from the literature (ARU, 2012b; HEA, 2012; QAA, 2009; Clegg and Bradley, 2006; Whitlock, 2005; Dearing, 1997) suggests that PDP should be seen as a vital part of a higher education course. PDP activities should relate to the world of work but also ensure that academic as well as employability skills are covered.

The three models of personal development practice suggested by Clegg and Bradley (2006) identified a simplistic approach to the way PDP can be viewed, which is not the case in the Department of Engineering and the Built Environment at Anglia Ruskin University. Within the construction management curriculum, PDP activities support all three areas. Whitlock (2005) revealed that PDP has three modular concepts, the benefit of which will be explored with final year built environment students at Anglia Ruskin University.

Evidence from the literature revealed the importance Anglia Ruskin University puts on developing academic success and employability skills, and the role PDP can play in the process. Reflection is seen as a key part of a student's development and the use of a portfolio offers students the opportunity to review and reflect on their academic progress as well as to plan and reflect on their employment and career opportunities since employability of graduates is such an important part of the higher education agenda.

6.0 Research Philosophy, Methodology and Data Collection

6.1 Introduction to the chapter

The four literature-based chapters have identified theoretical perspectives on professional competence; how students learn and apply knowledge; WBL and PDP. Key issues emerging from the literature will inform the conceptual framework and data gathering process. The employability skills and competencies for built environment students, models of professional competence and the importance of concrete experiences will be challenged during the higher-level personnel interviews. The constructivist's views on learning from experience and the design of the learning environment together with the importance of ethical and moral responsibility will be put to final year built environment students. Views from pathway leaders at UK universities offering a BSc Construction Management course will be sought on five key themes, that emerged from the literature and their inclusion within the design of a WBL curriculum will be proposed. The literature revealed several benefits of PDP and different models of PDP delivery and skill development. Reflective practice is seen as a key part of the student's development and a portfolio offers students an opportunity to plan and reflect on their academic and career competencies. All of these concepts will be discussed with final year built environment students and higher-level personnel.

The purpose of this chapter is to verify the selection of the optimum paradigm, the methodological approach proposed and the research methods employed to obtain data based on the key points identified in the literature. The research is mainly set in a positivistic paradigm with mixed methods research following a survey based methodological approach. The research combines a literature review and empirical investigation and is split into three interrelated areas: PDP, working based learning and professional competence. Although focusing mainly on construction management, the research is conducted in the wider built environment context as there is a clear overlap between several of the

disciplines covering architecture, architectural technology, building surveying, civil engineering, construction management, quantity surveying and real estate management.

This chapter considers why mixed methods provide a suitable strategy for data collection to explore and challenge the concepts derived from the literature. The chapter provides a critical analysis of the use of questionnaires, structured interviews and focus groups. The rationale behind a preliminary study is explored and the results will be discussed in the context of developing the main sample (subsequent study) for data collection. Ethical issues surrounding the research and how the researchers own epistemological viewpoint can influence the direction and outcome of the project will be examined. The reliability and validity of the data will be explored in the context of the data preparation methods and techniques, which will be used to sort and analyse the data.

6.2 Research philosophy

Over the last century, different paradigms or research philosophies have evolved. Fellows and Liu (2008) believe that these shape the way we see the world and determine the approach used to questioning and discovery. At a philosophical level, this research adopts a positivistic paradigm, assuming an objective world, which scientific methods can more or less readily represent and measure (Gerhardt, 2004). The research is inquiry led and it seeks to build on the anecdotal evidence and pilot study of second year construction management students at Anglia Ruskin University related to the problems encountered with an unstructured personal development programme, which is identified in Chapter 1.

Logical reasoning is applied to the research to achieve precision, objectivity and rigour. The research encompasses a scientific study following a quantitative approach to obtain measurable data from students at Anglia Ruskin University and pathway leaders at other UK universities. The ways in which students learn

will be explored and how their preferred learning environment affects the learning that takes place will be investigated.

The use of deductive reasoning emphasises an objectivist avenue to studying social phenomena. The benefits a structured programme of WBL can make to an academic qualification (Boud and Solomon, 2001; Margaryan, 2008) are explored by seeking the views of students and pathway leaders at other UK universities. These ideas can then be tested through empirical observation (Gray, 2009), in this case using a questionnaire.

New theory is emerging from the data through the development of an integrated model of PDP and WBL to enhance traditional academic theory. The subjective nature of the data obtained from structured interviews with higher-level personnel might suggest the research follows a qualitative approach (Hoxley, 2004). Gray (2009, p.22) supports this view and feels 'phenomenology becomes an exploration, via personal experience, of prevailing cultural understanding'.

6.3 Methodology

Research design is the master plan that guides the researcher on how to conduct research and which methods or processes to focus the research on. Research strategy can be defined as a 'systemic way of approaching research' (Kumar, 2008, p.5) and a 'logical structure of enquiry through which appropriate methods of data collection can be identified' (De Vaus, 2001, p.8-9). Its purpose is to enable the reader to answer the research question in a clear and concise way and in doing so, leave no doubt about the research findings. The choice of strategy to follow depends on the type of data needed in order to answer the research question (Williams, 2007). The aim of the research was defined in Section 1.5.

Mixed methods involving a survey based strategy provides the methodological approach. Mixed methods are proposed following a review of alternatives because quantitative and qualitative methods and diverse types of data are brought together in the same study, which may enable the researcher to gain a better insight and understanding into the research problem (Creswell, 2003; Molina Azorin and Cameron, 2010). Mixed methods allow knowledge to be derived from a qualitative (inductive) or quantitative (deductive) perspective (Jha, 2008, p.49). A pure quantitative study e.g. experimental would not capture the rich data available from a descriptive discourse whereas a pure qualitative study e.g. phenomenological would not generate the same level of numerical data.

An action research methodology offers the opportunity to use either a case study or experimental approach. A case study approach was not chosen, as the research is not focussed on one particular problem but several integrated areas (PDP, WBL and professional competence). An experimental approach of implementing an integrated model for an experimental group of students (construction management) and then analysing the results was also not chosen. This was because of the timescale of developing an integrated model then implementing it over the duration of the students' studies (minimum 3 years) and analysing the effect, would be impracticable as it is likely the research would extend beyond the registration period for a part time professional doctorate. Action research could also introduce ethical issues since implementing the model to one experimental group of students may affect their performance (positively or negatively) compared with the control group of other built environment students.

The mixed methods approach chosen allows the research to be tackled from more than one angle. The thoughts of current built environment students and course leaders at Anglia Ruskin University and higher-level personnel in the construction industry will be captured on the employability skills and competencies needed for study and employment. This inward facing strategy was chosen because it is important to seek out experts in the built environment/construction management fields as the research had a narrower

focus related to construction management education and professional practice. Using other disciplines (non-built environment) would have diluted the focus of the research topic (***The optimization of construction management higher education to promote professional competences and professional capability***). Higher-level personnel have considerable experience of the construction industry and the skills and competencies needed to be and perform as professionals. Pathway leaders at UK universities are experts in construction management education and finally built environment/construction management students have between 3-6 years HE experience and over 15 years educational experience.

Using mixed methods differing views and opinions are generated and brought together into a coherent whole. According to Johnson, Onwuegbuzie and Turner (2007) there are three types of mixed methods research: equal status, qualitative dominant (QUAL-quan research) and quantitative dominant (QUAN-qual research). Table 6.1 presents a description of the three approaches, which are then discussed in relation to this research.

Table 6.1: Description of the three approaches to mixed methods research (Source: Johnson, Onwuegbuzie and Turner, 2007, pp.123-124)

Research approach	Definition
Equal status	Equal status is the home for the person that self-identifies as a mixed methods researcher. This researcher takes as his or her starting point the logic and philosophy of mixed methods research. These mixed methods researchers are likely to believe that qualitative and quantitative data and approaches will add insights as one considers most, if not all, research questions.
QUAL-quan research	Qualitative dominant mixed methods research is the type of mixed research in which one relies on a qualitative, constructivist-poststructuralist-critical view of the research process, while concurrently recognizing that the addition of quantitative data and approaches are likely to benefit most research projects.
QUAN-qual research	Quantitative dominant mixed methods research is the type of mixed research in which one relies on a quantitative, postpositivist view of the research process, while concurrently recognizing that the addition of qualitative data and approaches are likely to benefit most research projects.

The researcher's postpositivist view of the research process influences a 'QUAN-qual' approach being taken to obtain a combination of numerical and descriptive data. In the first instance quantitative data is obtained through surveys using questionnaires but then seeks to justify the statistical data obtained using a qualitative approach of thematic analysis through structured interviews. Further quantitative data is obtained through further questionnaires following analysis of the qualitative data. Finally, a qualitative approach is carried out though focus groups with the data analysed in a descriptive context.

According to Gray (2009), mixed methods research can use quantitative and qualitative methods either independently or interdependently depending on how the research is conducted. Gray illustrates this in Figure 6.1.

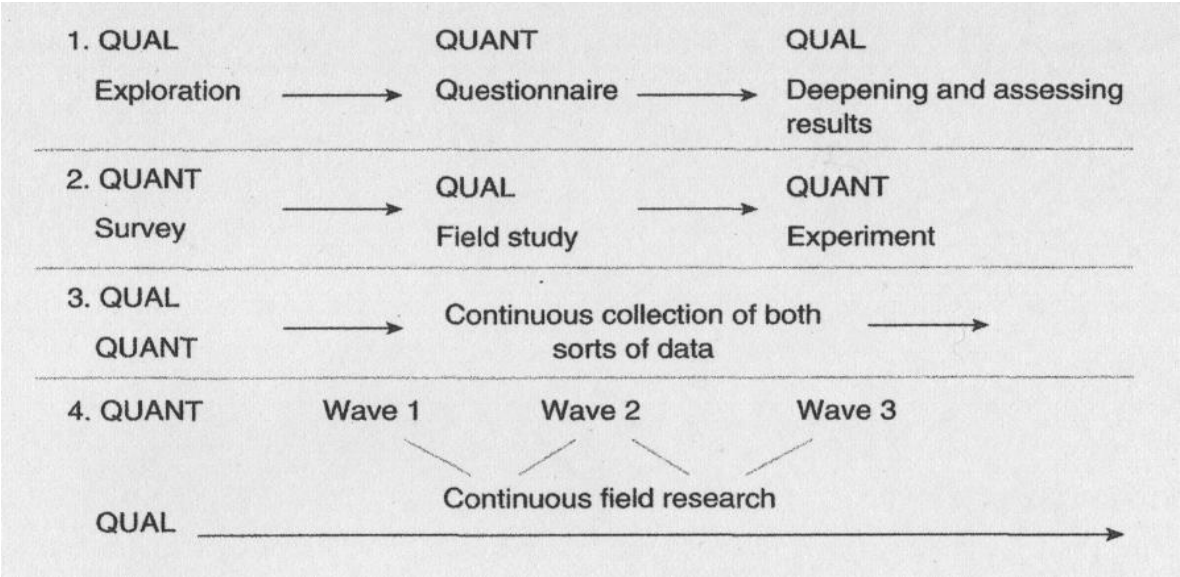


Figure 6.1: Four mixed methods models (Source: Gray, 2009, p.206)

The research project follows design 3 where both quantitative and qualitative methods are used interdependently. With this multi-level approach, neither method takes precedent; both have an equal part to play. The results of one method of data collection e.g. questionnaire informs another method of data collection e.g. structured interview and *vice versa*.

Much has been written on the 'insider and outsider researcher'. The work of Merton (1972) on the, 'sociology of knowledge', and the claim put forward that different groups in society, at a particular moment in time have difference access to knowledge. In research, the problems of being an insider researcher centre on a loss of objectivity with increased familiarity with the subject/person. Having prior knowledge can lead to bias. Alternatively, having a clear understanding of the subject being studied can be seen as an advantage of being an insider researcher. Whether the researcher is on the outside looking in or from the inside looking out there must always be objectivity.

This research design builds on the researcher's intimate understanding of the issues, problems and links surrounding PDP, WBL and professional competence and their involvement in professional educational practice. This 'insider researcher' approach contrasts with the traditional approach of the researcher being external or as an objective outsider to the research. As Positivists argue, 'the researcher is no longer objective and their results may be distorted' (Rooney, 2005, p.1). Since the research is using a mixed methods approach, multiple research strategies are used to enhance the validity or triangulation of data collection and as Gray (2009, p.213) indicates 'combining methods allows for one method compensating for the weakness or blind spots of the other.'

Mercer (2007, p.11) quotes the insider/outsider dichotomy as a, 'continuum with many dimensions'; suggesting that as the research progresses, the research moves backwards and forwards between the two areas. This research is conducted using the same principles. The ethos of the Professional Doctorate is about making a positive contribution to ones own professional practice and as such the research focuses on built environment education and the construction industry. By researching in my own institution I classify myself as an insider researcher as I am well known at a professional level to staff and students. Trowler (2011) shares the same view and indicates that 'insiderness' is not fixed as what counts as 'insiderness' depends on where you position yourself.

Researching outside of my own institution I am both an insider and outsider researcher. An insider in the context of being knowledgeable on built environment education and professional practice, but an outsider in that I do not know every pathway leader in the built environment at other institutions. I am an outsider with regard to higher-level personnel, as I am not working in industry but an insider as I share a passion for construction management and in some cases the personnel being interviewed know me at a professional level. This brings into question bias, (intended or not), and the ethical issues surrounding the insider researcher. Ethics and ethical issues are discussed in detail in Section 6.6.

6.4 Conceptual framework

The initial conceptual framework for this research is illustrated in Figure 6.2 and includes the key themes evolving from the literature reviews in the research area related to PDP, WBL and professional competence. The conceptual framework acts as a link between the literature, the methodology and the results (Vaughan, 2008).

The conceptual framework follows the structure of the work of Miller (1990) and his framework of clinical assessment. Miller's pyramid has a sequence of stages that demonstrates an increase in knowledge and ability to apply that knowledge the higher up the pyramid one goes. The conceptual model also has four stages and mirrors the concept identified by Miller, whereby an increase in knowledge and ability increases performance. This is further reinforced through the work of Dreyfus and Dreyfus (1980) and their skill acquisition model. The conceptual framework identifies a novice starting at the bottom of the pyramid and an expert at the top where one would expect the level of a professional to be located. To enhance performance the conceptual model utilises skill development and PDP together with academic study and WBL.

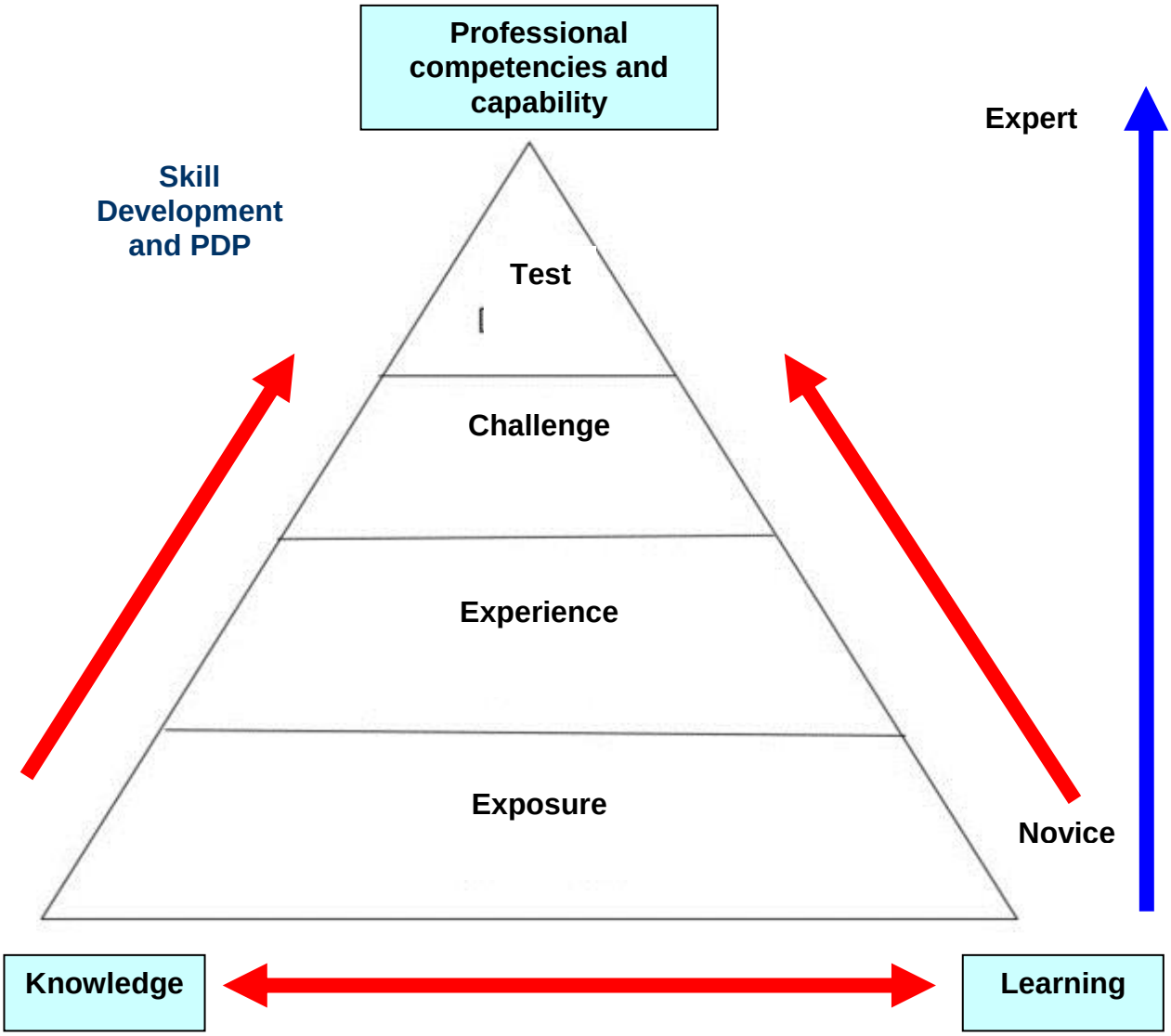


Figure 6.2: Initial conceptual framework (Adaptation of Miller, 1990; Dreyfus and Dreyfus, 1980)

The initial framework identified in Figure 6.2 does not fully articulate this research project. There is limited reference to the importance of skills (study and employment) and their relationship to professional competence. The model does not recognise the importance of reflective practice and does not indicate a clear route from graduate to professional. Professional competencies and capability are seen in the initial conceptual framework as one whereas the framework should show that the development and achievement of

competencies leads to becoming a professional via a capability and responsibility route.

Following the extensive literature review, a refined conceptual framework is illustrated in Figure 6.3. Graphically, this shows a clear diagram of the main areas (factors, concepts, variables) within the research project and the presumed relationship between the different parts (Miles and Huberman, 1994, p.18). The conceptual framework indicates the boundaries (structure/content) of the research project and how it develops (data collected/analysed) as the research progresses (Vaughan, 2008).

This refined conceptual framework is again based on the work of Miller (1990) and Dreyfus and Dreyfus (1980) but reinforces the importance of reflective practice as identified by Schön (1983). Learning theories play a part in the development of a firm foundation, which includes the concepts underpinning the four core components of professional competence and meta-competencies identified by Cheetham and Chivers (1998). A set of enhanced employability skills and competencies that students are exposed to are developed within the model.

The conceptual framework provides a context to interpret the research findings, which form the basis of the model of PDP and WBL to enhance traditional academic theory. The key stages from graduate through to professional are identified and are evident through increased performance.

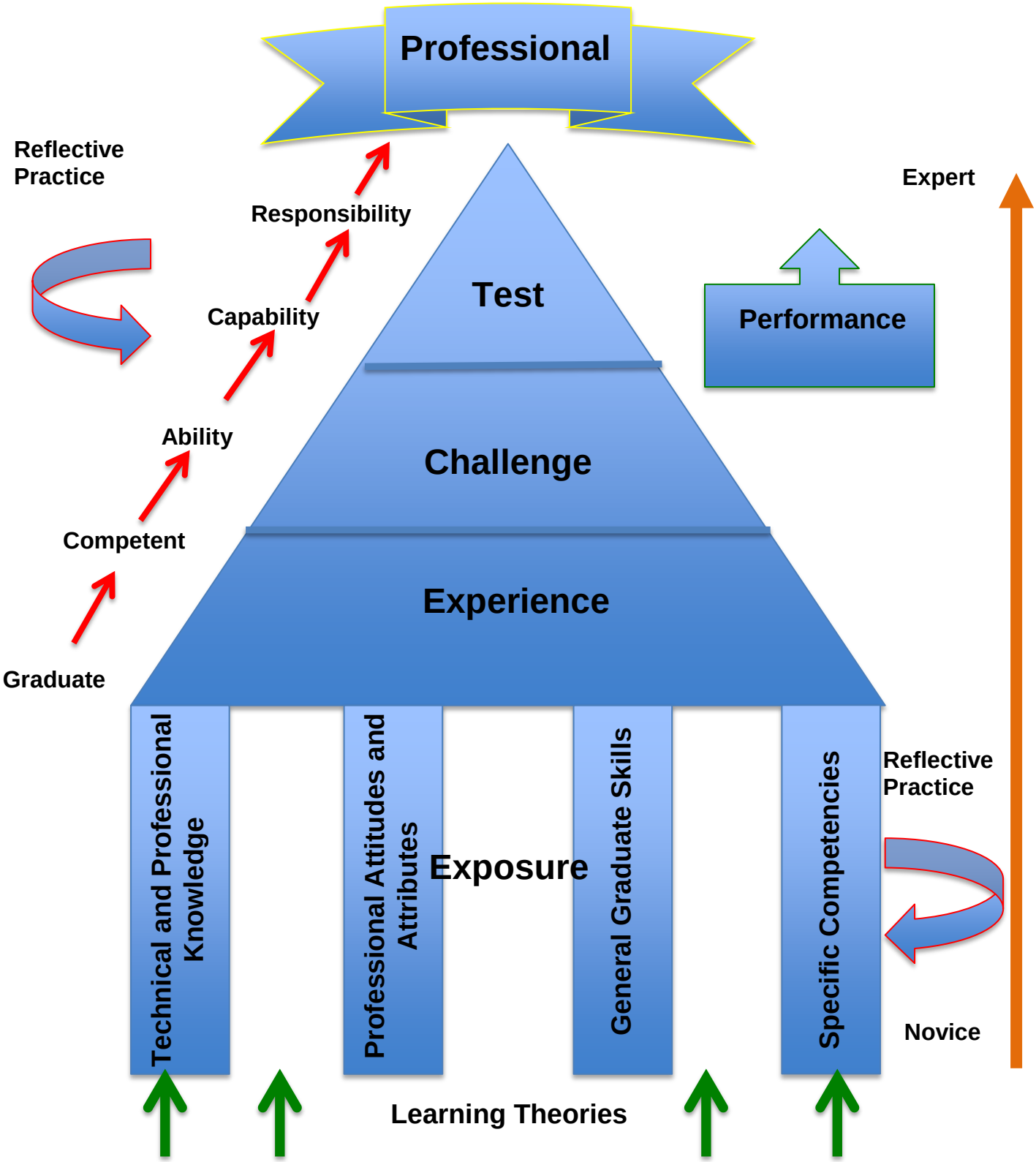


Figure 6.3: Refined conceptual framework (Adaptation of Cheetham and Chivers, 1998; Miller, 1990; Dreyfus and Dreyfus, 1980; Schön, 1983)

6.5 Methods of data collection

The research proposes that data is obtained through questionnaires (which consist mainly of closed questions), interviews that are in the main structured (and allow the respondent an opportunity to express their opinion) and through focus groups where in-depth feedback can be provided. The questionnaires are seen as following a positivistic approach, with the questions framed partly through the literature review and partly through the pilot study on PDP. The structured interviews, according to Collis and Hussey (2009) can follow either a positivistic or phenomenological approach. A positivistic approach is achieved with closed interview questions whereas open questions, which allow freedom of expression and can present analysis problems, follow a phenomenological approach (Bell, 2005, p.137). Although, structured interview questions are used for this research project, the respondents can elaborate on the points made. The level and detail of the responses is not restricted as long as the question has been answered. This is achieved by identifying key points, which the interviewer sees as being relevant to the discussion. Coverage of any of these key points will allow the interviewer to play a subservient role in the interview process. The interviewer will expand on the question, if need be and listen to other relevant detail.

McGrath (1982, cited in Amaratunga et al., 2002) has the view that there are no ideal solutions when making a research choice, only a series of compromises. Yin (2014) believes that the research strategy should be chosen as a function of the research situation. A multi research approach is used for the structured interview questions. Data obtained from descriptive narratives allow quotations to be included which indicates an understanding of social phenomena from the actor's own perspective (Turner, 2005, p.55). Numbers are, however, of interest and have been included where they add value to the research and can provide evidence to support points that are made.

The focus groups follow a phenomenological approach with each individual being treated equally and their opinions providing valuable data in the development of a suitable model.

Findings from the literature review and pilot study reveal the need for empirical data rather than anecdotal evidence and a limited set of responses on PDP. There are various ways to collect empirical data and surveys provide an opportunity for a representative selection of data, at a particular point in time, from the population to be gathered. According to Blaxter, Hughes and Tight (2010, p.76) surveys 'ask the questions which the researcher wants answered, and often they dictate the range of answers given'. They have the appeal of being able to make generalisations, within given parameters, supported by data, and with a degree of confidence that the findings are accurate (Cohen, Manion and Morrison, 2011, p.257). The research project will collect primary data through questionnaires and structured interviews (firstly through a preliminary study). Piloting data collection is vital as it allows the researcher to identify flaws in both the method of data collection and the time required for collection (Fellows and Liu, 1997, p.130).

In determining the methods of data collection, the what, why, where, when, how type questions are considered together with the scope and depth of data required in relation to the population and subsequent sample size. Fellows and Liu (1997, p.90) indicate that the choice at two ends of a continuum 'is between a broad but shallow study at one extreme and a narrow and deep study at the other, or an intermediate position'. This is illustrated in Figure 6.4 with the advantages and disadvantages of each method of data collection stated in Table 6.2.

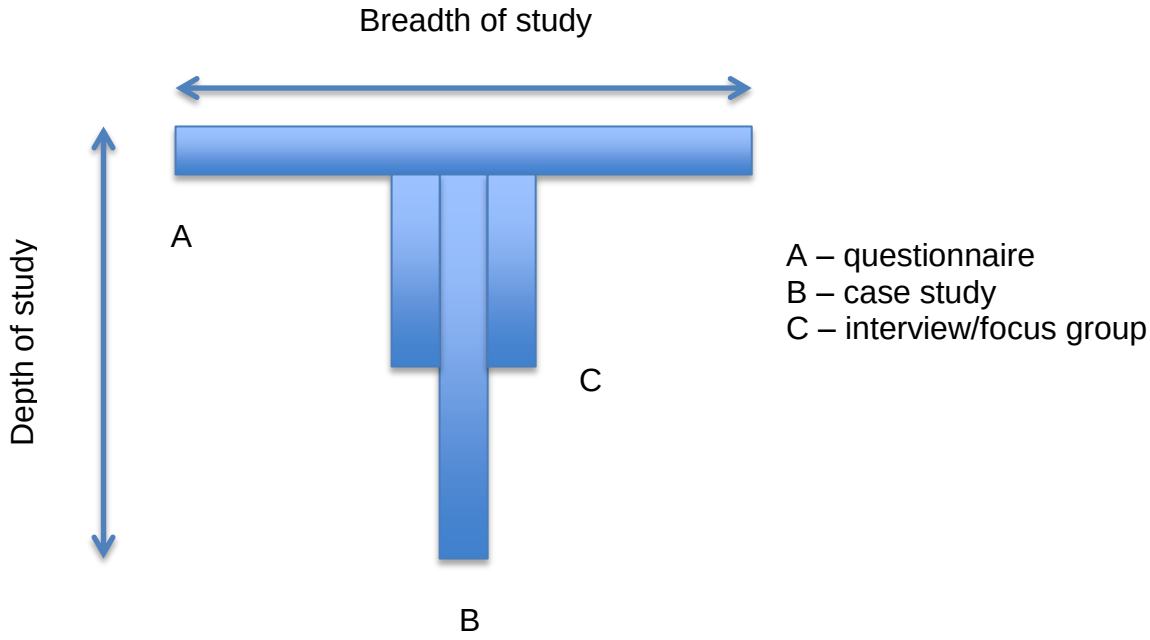


Figure 6.4: Breadth versus depth in question-based research (Source: Fellows and Liu, 1997, p.90)

Table 6.2: Advantages/disadvantages of each method of data collection

Method of data collection	Advantages	Disadvantages
Questionnaires	Able to gather a significant amount of data at relatively little cost (Beiske, 2002, p.4). Useful and relatively cheap method of rapidly collecting a wide range of views (Roberts-Holmes, 2005, p.143). Questionnaires allow the researcher to survey a population of subjects, with little or no personal interaction, and with the aim of establishing a broad picture of their experiences of views (Clough and Nutbrown, 2002, p.118).	Questions do not allow the researcher the opportunity to probe responses and investigate motives and feelings (Bell, 2010, p.161). Questionnaires sometimes raise more questions than answers (Roberts-Holmes, 2005, p.143).
Interviews	Highly flexible method, it can be used almost anywhere, and is capable of producing data of great depth (King, 1994, cited in Amaratunga et al., 2002 p.25). Able to follow up ideas and clarify issues (Beiske, 2002, p.4).	The validity can be questionable because it is highly subjective and might not be representative of the population. The non-verbal communications or body language of participants will have an impact on the responses and recordings (Fellows and Liu, 2008,

	It allows questioning to be guided as you want it and you can clarify points that need to be made clearer much more easily than in something like a mailed questionnaire (Frey and Oishi, 1995, p.3). Interviews are a way to get in-depth and comprehensive information. No significant time delay between question and answer; the interviewer and interviewee can directly react on what the other says or does (Opdenakker, 2006, p.3).	p.94). Interviews are time consuming and they are resource intensive (Valenzuela and Srivastava, 2007, p.3). The interviewee may have certain expectations and give what he or she considers is the 'correct' or, 'acceptable' answer to the question (Collis and Hussey, 2009, p.147).
Focus groups	Preliminary research technique to explore people's ideas and attitudes. Focus groups are inexpensive to set up (Collis and Hussey, 2009, p.156). Considered a relatively cheap and convenient way of getting information from several respondents in a short time (Ghauri and Granhaug, 2005, p.114). Useful when there are power differences between the participants and decision-makers or professionals (Gibbs, 1997, p 2). Focus groups elicit information in a way which allows researchers to find out why an issue is salient (Gibbs, 1997, p.3)	Sample is small and may not be representative of the population in general. A dominant respondent can negatively affect the outcome of the group and that group pressures may influence the comments made by individuals (Wimmer and Dominick, 1997, p.461). Limited in terms of their ability to generalise findings to a whole population, mainly because of the small numbers of people participating (Gibbs, 1997, p 2). By its nature focus group research is open-ended and cannot be entirely predetermined (Gibbs, 1997, p.3).

6.5.1 Sampling strategy

According to Fellows and Liu (1997, p.103) 'Sampling is necessary because it is rarely possible to examine an entire population.' The samples chosen by the researcher are on the basis that they 'represent the population as a whole, that is, the sample's main characteristics are similar or identical to those of the population' (Grey, 2009, p.148). The sampling strategy was highly structured and it placed a great emphasis on the careful random selection of samples so that the results can be generalised to other built environment courses and other HE institutions.

The research utilises three different methods of data collection. Table 6.3 provides an indication of how each research objective is achieved through the different methods of data collection and a justification for their use. Questionnaires are selected where the breadth of study is seen as being more important than the depth of answers given and interviews are chosen where depth, narrower focus and detail of the answers are of a higher priority than a wide set of topics. Focus groups can gather information, which is beyond the scope of quantitative research however the researcher should not bias the findings.

Table 6.3: Mapping of research objectives, methods of data collection and justification for their use

Objective	Method of data collection	Justification of research method
1. Identify what is included in the process of learning and how students might apply knowledge in both an academic and workplace setting.	**Literature review**. **Questionnaire** The first research objective requires the views and opinions of Anglia Ruskin University undergraduate Built Environment students to be obtained. This research gathers using a questionnaire, a significant amount of data from students on how they learn and applied knowledge. Construction management students at Anglia Ruskin University are asked for their opinion on the 'super suite of employability skills and competences'.	To establish theoretical perspectives from published research. In excess of 300 students and the questionnaire is seen as a quick way of capturing a significant amount of data covering students, pathways and groups across a range of issues. This enables a quantitative analysis of statistical sampling to be made. A questionnaire to construction management students is chosen as it easily enables students to provide quick feedback on the 'super suite of employability skills and competences'. Two areas of the skills and competencies are more general and the other two areas are construction management specific.
2. Establish whether a structured programme of PDP and professional skill development is likely to enhance capability.	**Literature review**. **Questionnaire** Research objective two takes the research one step further with a questionnaire being given to Anglia Ruskin University final	To establish theoretical perspectives from published research. In excess of 300 students and the questionnaire is seen as a quick way of capturing a significant amount of data covering students,

	year undergraduate Built Environment students. Students are asked for their experience of PDP and what knowledge and skills substantiate and enhance success in order to become a professional in their area. The questionnaire also captures what is meant by ethics and professional responsibility and asks the students to identify which employability skills taken from the Course Specification Forms (CSFs) are present on their courses. **Interviews** A representative sample of experienced professionals working at the cutting edge of the construction industry are interviewed, firstly through a preliminary study, to explore if, the higher-level personnel had studied a structured programme of PDP and professional skill development, as part of an academic award, would they have achieved their current position quicker and be more capable at their job.	courses and groups across a range of issues. This enables a quantitative analysis of statistical sampling to be made. The interviews allow thoughts and ideas to be captured in more detail than with a questionnaire. This gives a greater depth to the study and enables a qualitative analysis to be made.
3. Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work	**Literature review**. **Questionnaire** A questionnaire is sent to built environment pathway leaders at UK universities offering a BSc Construction Management course. The questions are based on the literature review and in-depth responses regarding the contribution WBL can make to professional competence, from higher-level personnel. **Interviews** The structured interviews with a representative sample of experienced professionals working at the cutting edge of the construction industry explore if, the experienced professionals had studied a structured programme of WBL as part of an academic award, would they have achieved their current	To establish theoretical perspectives from published research. The questionnaire was seen as an easier way of capturing a significant amount of data from pathway leaders. This data was then analysed through a quantitative analysis. The interviews allow thoughts and ideas to be captured in more detail than with a questionnaire. This gives a greater depth to the study and enables a qualitative analysis to be made.

	position quicker and be more capable at their job.	
4. Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.	**Literature review**. **Interviews** The structured interviews with a representative sample of experienced professionals working at the cutting edge of the construction industry explore whether academic study is important to these personnel. The interviews identify what professional training is preferred and how that training is applied in the workplace.	To establish theoretical perspectives from published research. The interviews allow thoughts and ideas to be captured in more detail than with a questionnaire. This gives a greater depth to the study and enables a qualitative analysis to be made.
5. Propose an integrated model of PDP and WBL to enhance traditional academic theory.	**Literature review**. **Focus Groups** Focus groups of academic staff and construction management students at Anglia Ruskin University, and experienced professionals working at the cutting edge of the construction industry provide detailed feedback on the integrated model during its design and production.	To establish theoretical perspectives from published research. The focus groups enable the researcher to draw upon staff, students' and experienced professionals' attitudes, perceptions and beliefs so that a consensus of opinions on the new model can be established.

6.5.2 Questionnaires

Five different questionnaires are distributed (two to final year built environment, one to Pathway Leaders at UK universities offering a BSc Construction Management course, one to all construction management students and one to final year construction management students). A rationale for using the different research groups for the questionnaires is given in Table 6.4.

Table 6.4: Rationale for using the different research groups for the questionnaires

Topic	Research group	Rationale for using each research group
How students learn and apply knowledge	Final year built environment students	This group was chosen as the students had spent up to 3 years full-time and six years part-time studying at ARU and therefore had experience of study at HE level. All final year built environment students rather than just one course/group were chosen to enable the researcher to undertake an overall analysis, comparing different student groups e.g. civil engineers and construction managers, and see if there are any significant differences and/or trends that need further investigation.
Personal development planning and skill development (based on information on the CSFs)	Final year built environment students	All final year built environment students are chosen to enable the researcher to undertake an overall analysis, comparing different student groups e.g. civil engineers and construction managers, and see if there are any significant differences where the focus of the course is slightly different.
Contribution work-based learning can make to the curriculum	Pathway leaders running a BSc construction management course at other UK universities	This group was chosen, as they are experts within the built environment educational field and possibly the wider construction industry. The sample size was limited to a more construction management focused group.
Draft super suite of employability skills and competencies	All construction management students	This group was chosen because the super suite covers both general (graduate skills, and personal attitudes and attributes) and construction management specific (technical and professional knowledge, and career competencies) areas and all students have experience of their course

		(positive and negative).
Additional questionnaire following the mid semester review, what students learnt	Final year construction management students	This particular course is chosen, as the group are easily accessible enabling the research to be triangulated with the results of the main questionnaire given to all final year built environment students.

The sample sizes for the questionnaires were determined using the criteria suggested by Bartlett, Kotrlik and Higgins (2001) in relation to Cockran's (1997) formula, which estimates the margin of error. Appendix 6.1 provides a summary of the population and sample size required for each of the five questionnaires.

Data collection on how students learn and apply knowledge follows mainly a quantitative approach through the use of a questionnaire (Appendix 6.2) to Anglia Ruskin University undergraduate built environment final year students. It is collected on a 'one-shot' basis rather than longitudinally (Cohen, Manion and Morrison, 2013, p.140). At the time of the study, 314 undergraduate students are registered in their final year and a questionnaire provides a relatively quick and efficient way to collect data. The response rate (sample returned 166 – 53%) was disappointing since the students are easily accessible (within the researcher's own institution) however the researcher is mindful that students have many pressures on their time and they are asked to complete other university wide surveys such as module evaluation, the student experience survey and National Student Survey. Questionnaires were returned from six out of seven course areas.

The questionnaire sought to answer the first research objective, which is '*To identify what is included in the process of learning and how students might apply knowledge in both an academic and workplace setting.'* The most direct way to find out how students learn and apply knowledge is to ask them (Turner, 2005, p.55). As students have usually had at least 13 years educational experience by the time they reach university, they are uniquely placed to judge

the merits, as non-experts, on the most appropriate ways to learn. There are fourteen questions, which generate quantitative data and one question, which allows the respondent to express a qualitative view on the definition of learning.

Nominal scales are used to denote categories or groups, for example whether the students are studying full or part time. Ordinal scales such as rating scales and Likert scales are used to indicate the strength of feeling or opinion to a particular statement or question. By using this type of approach the researcher is able to compare one group's feelings with that of another group of respondents (Fellows and Liu, 1997).

A quantitative approach is also used with three further questionnaires. One being given to undergraduate final year built environment students at Anglia Ruskin University (Appendix 6.3), one to pathway leaders at UK universities offering a BSc Construction Management course (Appendix 6.4) and one to all construction management students at Anglia Ruskin University (Appendix 6.5).

The questionnaire to undergraduate final year built environment students (population – 323) is based on the literature review of PDP and professional skill development. It also uses evidence of the skills that are present on built environment courses at Anglia Ruskin University (as identified by course leaders from the CSFs) and also the outcomes from the main interviews to higher-level personnel in the construction industry. The interview questions themselves are based on the information from QAA (2012a, 2012b, 2012c, 2008) (on the Quality Code and Subject Benchmark Statements), the information from CIC (2012) (on Graduate Common Learning Outcomes), the template presented by Higher Education Academy Centre for Education in the Built Environment (2004), ARU (2011a) Employment Strategy 2011-2014, ARU (2011b) Learning, Teaching and Assessment Strategy, the University of Kent (2011) Employability Skills Map and the work of Edwards (2009) on the four foundation degree projects.

The questionnaires are colour coded depending on the course being studied. This is to make sure that a particular cohort of students e.g. construction

management only answered the first question which is related to the information on their CSF. The questionnaire achieved a response rate of 38% (123 out of 323).

The questionnaire to pathway leaders is also based on the literature review and the outcome of the preliminary interviews to higher-lever personnel in the construction industry and it considers the contribution WBL can make to the curriculum. The researcher chose the recipients of the questionnaire by searching the UCAS (2012) website for BSc Construction Management courses. The search revealed 76 courses at 47 institutions. Of these 35 are relevant (foundation degree courses are discounted) and the questionnaire is sent to institutions covering construction management, construction project management and property development, construction and project management, design and construction management, construction and commercial management, project management for construction, construction engineering management, construction management and the environment, and project and construction management. The questionnaire achieved a response rate of 43% (15 out of 35).

The questionnaire to all Anglia Ruskin University undergraduate construction management students (population – 141) asks for feedback on the draft version of the 'super suite of employability skills and competencies' defined in Appendix 7.14, which followed previous student questionnaires and interviews with higher-level personnel. The questionnaire achieved a response rate of 34% (48 out of 141). The feedback is useful before finalising the integrated model of PDP, WBL and skill development to see if there are any differences of opinion between the construction management year groups.

An additional qualitative questionnaire is given to the final year construction management students (population – 44) at Anglia Ruskin University (Appendix 6.6) following the mid-semester review, which takes place after week 6 during the first semester of the academic year 2013/14. The aim of this questionnaire is to find out from construction management students what they get out of the

modules and what skills they develop in the modules. The questionnaire achieved a response rate of 61% (27 out of 44).

Questionnaires are a useful tool in gathering data on people's opinions, beliefs, attitudes and responses to a series of stimuli questions (Wisker, 2001, p.147). The researcher ensured all of the questionnaires are relevant to the research and could be easily understood by giving each questionnaire to a small group of staff and asking for their opinion and comments. This process of checking makes sure the questions are legible, easy to answer, unambiguous and relevant to the research. The elimination of bias is of paramount importance. Bias, in this instance, is limited by preventing the use of leading questions, and also by the sample of students and pathway leaders chosen in relation to the population.

It is also important when designing the questionnaires to ensure the anonymity of the respondents. Names are not asked for as this could have been seen as threatening. The length of the questionnaire can be an issue, both in terms of the number of pages and the number of questions. 'In general, the shorter the questionnaire is, the easier it is to fill out and the higher the response rate will be' (Anastas, 2012, p.382). Fellows and Liu (1997, p.92) also indicate that 'The questions should be unambiguous and easy for respondents to answer.'

The questionnaires contain 'open' and 'closed' questions. A closed question is one in which the respondents are offered a choice of alternative replies. They have been asked to tick their replies, and they include some simple alternatives such as 'yes and no' questions. Open or free-response questions are not followed by any kind of choice. The advantages of closed questions are that they are attitudinal as well as factual, and are easier and quicker to answer. They require no writing and quantification is straightforward. This means that more questions are asked within the questionnaires. However, the disadvantages of closed questions are the loss of spontaneity and expressiveness, and this is the reasoning behind asking a mixture of open and closed questions.

The vast majority of the questions require the respondent to tick only one box. This enables the questions to be easily analysed and compared with existing results and findings. The results of the questionnaire are given in Chapter 7.

6.5.3 Interviews with experienced professionals working at the cutting edge of the construction industry

Interviews allow the interviewer to discuss, in more depth, the subject directly with the interviewee. As King (1994, cited in Amaratunga et al., 2002) states, a research interview is best suited where 'a quantitative study has been carried out, and qualitative data are required to validate particular measures or to clarify the meaning of the findings' (p.25). This will be done, not through a specific hypothesis but to produce an integrated model for PDP and WBL, which enhance traditional academic theory. According to Fellows and Liu (1997, p.94) the 'inputs of the interviewer are critical – especially probing – so the questions asked, and probes, will influence the responses obtained.'

The structured interview sees the researcher use a scripted set of questions rather than a more formal, conversational approach. This method is chosen to elicit direct answers from the experienced professionals working at the cutting edge of the construction industry, enabling them to report detailed facts on their opinions rather than loosely touching the subject, therefore missing key points. For the purpose of this research experienced professionals working at the cutting edge of the construction industry are referred to as higher-level personnel and are defined as:

1. **Individuals who have senior authority and hold a position of responsibility within a company.**

   They are seen as experienced professionals who would satisfy either of the two routes outlined below for professional membership of the CIOB.

2. ***Experienced Professional Route***

An individual with at least five years' professional construction industry experience, but with either a **UK honours degree or equivalent that is not in a construction-related discipline** or those who hold a current **Chartered** level membership of another professional institute.

3. ***Experienced Practitioner Assessed Report (EPA/Professional Review) route***

An individual with typically ten year's experience, who can demonstrate substantive experience in a senior management role within the built environment which includes significant responsibilities for people, finances or technical change.

6.5.3.1 Preliminary study

A preliminary study (Appendix 6.7) of five higher-level personnel working in the construction industry is carried out from June 2012 to August 2012. All interviews are transcribed. The five respondents are selected from organisations that the researcher has had dealings with during his 30 years of professional life. Although this method of interviewee selection lacks complete randomness, it is acceptable as suggested by Bell (2005) if the limitations are acknowledged and there is a process in place to ensure the sample is as random as possible. The selection criteria are based on achieving a representative sample of the population of the construction industry. In order to choose a representative sample, the population has to be established.

In the United Kingdom (UK), the Central Statistics Office (CSO) is responsible for the national statistics, an element of which is the Standard Industrial Classification (SIC). 'The classification provides a framework for the collection, tabulation, presentation and analysis of data, and its use promotes uniformity'

(UK SIC, 2007). A definition of the construction industry is contained within the classification and is shown in Table 6.5 with a summary of the structure of the construction industry as defined in accordance with Divisions 41 – 43 shown in Table 6.6.

Table 6.5: Scope of the construction industry (Source: UK Standard Industrial Classification of Economic Activity, 2007)

Section F – Construction
This section includes general construction and specialised construction activities for buildings and civil engineering works. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature.
General construction is the construction of entire dwellings, office buildings, stores and other public and utility buildings, farm buildings etc., or the construction of civil engineering works such as motorways, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities, etc.
This work can be carried out on own account or on a fee or contract basis. Portions of the work and sometimes even the whole practical work can be subcontracted out. A unit that carries the overall responsibility for a construction project is classified here.
Also included is the repair of buildings and civil engineering works.
This section includes the complete construction of buildings (division 41), the complete construction of civil engineering works (division 42), as well as specialised construction activities, if carried out only as a part of the construction process (division 43).
The renting of construction equipment with operator is classified with the specific construction activity carried out with this equipment.
This section also includes the development of building projects for buildings or civil engineering works by bringing together financial, technical and physical means to realise the construction projects for later sale.
If these activities are carried out not for later sale of the construction projects, but for their operation (e.g. renting of space in these buildings, manufacturing activities in these plants), the unit would not be classified here, but according to its operational activity, i.e. real estate, manufacturing etc.

Table 6.6: Structure of the construction industry (Source: UK Standard Industrial Classification of Economic Activity, 2007)

Division	Group	Class and Subclass	Description
Section F			**Construction**
41			**Construction of buildings**
	41.1		Development of building projects
		41.10	Development of building projects
	41.2		Construction of residential and non-residential buildings
		41.20	Construction of residential and non-residential buildings
		41.20/1	Construction of commercial buildings
		41.20/2	Construction of domestic buildings
42			**Civil engineering**
	42.1		Construction of roads and railways
		42.11	Construction of roads and motorways
		42.12	Construction of railways and underground railways
		42.13	Construction of bridges and tunnels
	42.2		Construction of utility projects
		42.21	Construction of utility projects for fluids
		42.22	Construction of utility projects for electricity and telecommunications
	42.9		Construction of other civil engineering projects
		42.91	Construction of water projects
		42.99	Construction of other civil engineering projects n.e.c.
43			**Specialised construction activities**
	43.1		Demolition and site preparation
		43.11	Demolition
		43.12	Site preparation
		43.13	Test drilling and boring
	43.2		Electrical, plumbing and other construction installation activities
		43.21	Electrical installation
		43.22	Plumbing, heat and air-conditioning installation
		43.29	Other construction installation
	43.3		Building completion and finishing
		43.31	Plastering
		43.32	Joinery installation
		43.33	Floor and wall covering
		43.34	Painting and glazing
		43.34/1	Painting
		43.34/2	Glazing
		43.39	Other building completion and finishing
	43.9		Other specialised construction activities
		43.91	Roofing activities
		43.99	Other specialised construction activities n.e.c.
		43.99/1	Scaffold erection
		43.99/9	Specialised construction activities (other than scaffold erection) n.e.c.

Statistics from the CSO enable a picture of the population to be made. Table 6.7 shows the number of businesses classified to construction related to the size of firms (by number employed) in Great Britain in the 3rd quarter of 2010.

Table 6.7: Number of businesses classified to construction related to the size of firms (by number employed) in Great Britain in the 3rd quarter of 2010 (Source: Office for National Statistics, Construction Statistics, No. 12, 2011 Edition)

Size of firm (by number employed)	Number of businesses classified to construction	Percentage of the total number of businesses
1	135,470	52.83
2-3	65,432	25.52
4-7	32,119	12.52
8-13	11,774	4.59
14-24	6,029	2.35
25-34	1,864	0.73
35-59	1,896	0.74
60-79	593	0.23
80-114	472	0.18
115-299	525	0.20
300-599	145	0.06
600-1,199	60	0.02
1,200 and over	62	0.02
All firms	**256,441**	**100**

There are 256,441 businesses classified to construction in 2010 according to the Department of Trade and Industry (DTI) with the majority of firms in the industry (90.87%) employing 7 or less people, however many of these companies will not satisfy the criteria of the higher-level personnel category. Whilst small firms dominate the number of businesses they are less important in

terms of output. Table 6.8 shows the value of work done in the 3rd quarter of 2010 classified to construction related to the size of firms.

Table 6.8: Value of work done classified to construction related to the size of firms (by number employed) in Great Britain in the 3rd quarter of 2010 (Source: Office for National Statistics, Construction Statistics, No. 12, 2011 Edition)

Size of firm (by number employed)	Value of work done (£M)	Percentage of the total value of work done
1	6,295	5.50
2-3	10,012	8.75
4-7	9,243	8.08
8-13	8,778	7.67
14-24	9,750	8.52
25-34	5,488	4.80
35-59	8,876	7.76
60-79	3,399	2.97
80-114	5,147	4.50
115-299	10,706	9.36
300-599	9,085	7.94
600-1,199	6,128	5.36
1,200 and over	21,523	18.81
All firms	**114,430**	**100**

Firms employing 115 people or more account for only 0.3% of the number of businesses yet they account for 41.5% of construction output. With this important sector of the construction industry in mind, the following sample of businesses (Table 6.9) will be determined for the preliminary study.

Table 6.9: Number of businesses in the preliminary study

Size of firm (by number employed)	Number of businesses for the preliminary study
1-7	1
8-59	1
60-114	1
115 and over	2

This stratified sampling technique makes allowances for known differences within the sample. The population has been divided into sub-categories (size of firm) to accurately represent the different sections and variants within the population. A representative number of businesses will be chosen from that sub-category to ensure that the population is represented. According to Isaac and Michael (1995), research with small samples is justifiable when:

i) the research involves an in-depth study (interviews with higher-level personnel) and enormous amounts of qualitative data are forthcoming from individual respondents.
ii) it is not necessarily economically feasible to collect a large sample.

The preliminary study provides an important opportunity to assess interviewee's responses and refine the research design. The interviews seek to provide data that could be used to answer the following research objectives:

- *Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.*
- *Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work.*

- *Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.*

The interview questions are grouped into four key areas:

- Background information
- Importance of academic study and professional training
- Competence, capability and professional status
- PDP, professional skill development and WBL

The purpose of background information questions is to establish the level of education and experience of the interviewees and how they have achieved their higher-level position within the company and what they see as the work of a professional in the construction industry. The questions relating to academic study and professional training seek to explore whether academic study is important to these personnel and to identify the type of professional training that is preferred and how that training can be applied in the workplace.

The interviews also seek to obtain higher-level personnel views on professional competence and capability and the potential attributes possessed by professionals working in the construction industry. The final set of questions considers the importance of 'employability skills' and the relevance of PDP and WBL.

Feedback from the preliminary interviews, which took between 20 – 40 minutes, indicates that all five interviewees appear to understand the interview process and all provide full answers to the questions asked. Occasionally, a supplementary clarification is needed which relates to the meaning of the following terms: professional training, employability skills, and concrete experiences. None of the five respondents are able to suggest any omissions from the interview questions.

All respondents found the participant information sheet (sent out in advance) particularly useful as it gives an overview of the research project and the purpose of the structured interviews. They found the sequencing of questions and the time taken for the interviews to be appropriate. Occasionally there is an overlap between responses to one question covering a subsequent question.

The interviews are conducted in two parts to allow participants to complete a single sheet listing the attributes, which they feel are most important to the role of a professional. This question is deferred until after the interviews are complete so that the tape is not stopped, then started again. The results of the interviews are given in Chapter 7.

6.5.3.2 Subsequent study

As a result of the preliminary study, a number of changes are made to the interview questions:

- A reduction of four key areas of questioning to three key areas which takes account of similar and/or rogue questions
- Additional clarification of the wording of some questions
- More in-depth questions, where appropriate, resulting from a great depth of literature review.

A final version of the structured interview questions can be found in Appendix 6.8.

The research sample consists of an additional eight higher-level personnel employed by the spectrum of size of firms in the construction industry as identified for the preliminary study. The sample is chosen using:

a) the university database of local and regional firms who send students on built environment courses

b) the knowledge of colleagues in the Department of Engineering and the Built Environment at Anglia Ruskin University.

The characteristics of the subsequent study sample (interviews carried out between July 2013 and January 2014) are given in Table 6.10.

Table 6.10: Number of businesses in the subsequent study

Size of firm (by number employed)	Number of businesses for the research sample
1-7	1
8-59	1
60-114	2
115 and over	4

Data from the preliminary interviews is included in the subsequent study where this is seen as adding value to the discussion and analysis.

6.5.4 Focus groups

Finally, a qualitative analysis is made with data obtained from two focus groups (5 to 10 participants/group). Powell and Single (1996, p.499) defines a focus group as 'a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research'. Focus groups are chosen to discuss the proposed model because the researcher wishes to draw upon the respondent's views, attitudes, experience (positive or negative), understanding and beliefs in a way that the group dynamics of a social gathering could reveal individual hidden views where individual structured interview questions could not (Gibbs, 1997). In a group environment, individual comments are likely to trigger debate amongst the participants, which can provide a rich source of data. Focus groups capture data based on the interaction of the participants (Kitzinger, 2006). The use of

focus groups in combination with the student questionnaire is a useful way of bringing together qualitative and quantitative methods (Morgan, 1996).

Participants are recruited to the focus groups through purposive sampling, a technique used by qualitative researchers where the subjects are selected by virtue of traits or characteristics that the researcher considers to be relevant to the project (Barbour, 2008; Gray, 2009). Two manageable size groups are chosen to enable the views of different types of respondents, with different experiences and beliefs to be obtained. One larger group may have been more difficult to manage (trying to capture individual responses) and it could have been more of a challenge to bring together in one location many different participants with the researcher being mindful of impinging on peoples time (including travel time). Group 1 consists of higher-level personnel specific to construction management and recent graduates from the Department of Engineering and the Built Environment at Anglia Ruskin University (both these groups of respondents are not directly involved in the course but have an interest in its content/structure). Group 2 consists of academic staff and current construction management students in the Department of Engineering and the Built Environment at Anglia Ruskin University (both these groups of respondents are currently involved directly with the construction management course therefore are able to comment on current issues). (Kitzinger, 2006) warns of a perceived hierarchy that may exist between staff and students, which could influence the data. Any perceived hierarchy is carefully managed.

Before the focus groups begin, participants are made aware of the purpose of the focus group through the focus group brief (Appendix 6.9) and participant information sheet (Appendix 6.10). This ensures the focus group members are comfortable in their role and what the group is being asked to discuss and comment upon. The focus group brief contains a series of guiding questions related to the seven areas identified below:

- Final ‘super suite of employability skills and competencies’
- Course structure diagrams (existing and proposed BSc Construction Management course)
- Proposed model of knowledge and skills activity
- Skills and competencies matrix
- Links between the modules
- Module definition forms for the proposed new modules
- Mapping of modules to the CIOB Education Framework

The focus groups take place in a relaxed manner with refreshments made available to the participants. Within the focus groups an organised discussion (following the focus group brief) takes place, which enables the researcher to capture the views and experiences of the participants. The focus groups allow in-depth feedback to be provided on the design and production of an integrated model of PDP and WBL to enhance traditional academic theory. As Sachdeva (2009, p.180) puts it ‘The facilitator or moderator uses group dynamic principles to focus or guide the group in an exchange of ideas, feelings, and experiences on a specific topic.’ Different views emerge and group dynamics can facilitate new ideas being generated with the research moving in new and unexpected directions (Kitzinger, 2006; Gray, 2009). Group dynamics can also have disadvantages with a dominant participant persuading the more timid participants that their view is correct (Donley, 2012, p.46). Effective moderation of the focus groups ensures all participants are able to express their views in a non-threatening environment.

6.6 Ethics

The collection of data from this research project involves people and therefore necessitates ethically sound processes. The Concise Oxford Dictionary defines ethics as ‘**1** the science of morals in human conduct. **2 a** moral principles; rules of conduct **b** a set of these’ which indicates that ethics involves a set of

processes the researcher must follow and in doing so behaves in a worthy way. Following an ethics procedure should ensure that no harm comes to either the researcher or the participants and their reputation remains intact.

The purpose of this section of the thesis is to define how the research upholds the principles and advice laid down by the British Educational Research Association (BERA). All researchers should 'operate within an ethic of respect' (BERA, 2011, p.5) to oneself and to all participants affected by the research. All individuals are treated with dignity and respect with no prejudice shown to anyone irrespective of their age, gender, sexuality, race, etc. The research is carried out in an ethical manner as described above and to the Anglia Ruskin University's ethics guidelines and ethics approval process. The literature review process ensures all data collected is referenced in accordance with the university's Harvard Referencing guidelines which indicate that the author, date of publication, publisher and general content should be stated. The thesis is then submitted to 'Turnitin' to check for improper citations and poor academic practice.

The thesis could be seen as an example of a work-based project and there are many factors that influence their success. Researchers working in their own area of practice are in a unique position of being able to have access to, what Costley, Elliott and Gibbs (2010, p.2) calls 'insider knowledge'. This enables them to make changes to current working practices based on the research outputs and 'inside knowledge' of complex problems. Unfortunately, this 'inside knowledge' can influence the outcome of the research, which leads to ethical issues, which will be discussed later in this section.

The investigation is looking at developing a new model linking PDP, WBL and professional competence. It is good ethical practice that the researcher discusses the research with colleagues who are affected by the work. This involves briefing subject tutors who currently run PDP and WBL modules as well as members of the Senior Management Team (SMT) in the Department of Engineering and the Built Environment.

An ‘insider-researcher’ needs to demonstrate responsibility and be aware of bias and ensure subjectivity in the research that is carried out. Within the investigation, the researcher has a vested interest in improving current practice but the research should not drive change, it should highlight the benefit of change based on clear, carefully thought out evidence based arguments. Validity is vital if the research is to stand up and be deemed worthy of doctoral study. Trust between the researcher and participants are crucial for the success of the research.

Whilst collecting qualitative data through the structured interviews to higher-level personnel, the researcher needs to exercise care since the principle of reflexivity applies with the interaction between researcher and participants in the research process (Colombo, 2003). This is a concept which implies that the researcher is not distant from the research and by the very nature of being involved with the structured interviews (observer effect), could be selective in data gathering, data forming and data analysis. The researcher is seen as not being impartial which leads to implications of bias and validity of the research (Gray, 2009, p.498).

The role of Head of Department also affects the way the research is carried out with the boss (researcher)/sub-ordinate arrangement being a possible area of conflict. Loue (2000, p.100) defines conflict as occurring whenever ‘a personal interest or role obligation to uphold another parties’ interest thereby compromising normal expectations of reasonable objectivity in regard to other parties’. An inclusive management style that promotes honesty and trust whilst working with colleagues should manage the power implications of the Head of Department role.

Reflective practices are another useful tool that both the researcher and Head of Department should undertake. The ideas Schön (1983) had on ‘reflection-in-action’ and ‘reflection-on-action’ are worth perusing. Whilst discussing the research with work colleagues, I am able to implement ‘reflection-in-action’ on the conversation by observing colleagues facial expressions and listening to the comments made. Following the preliminary structured interviews with higher-

level personnel, ‘reflection-on-action’ enabled a revised set of questions, where applicable to be implemented for the subsequent study.

The research involves gathering opinions of present students and staff of Anglia Ruskin University, pathway leaders at UK universities offering a BSc Construction Management course and higher-level personnel in the construction industry. All participation is voluntary and prospective participants are free to refuse to take part from the outset of the research. Any participant also has the option to withdraw at any time from the study and have their contribution omitted should they wish. It is important that participants are aware of this to ensure the research is being carried out in an ethical way.

The data collected from these sources is presented in a confidential manner and has not made reference to a student/staff member’s name or that of any individual and/or organisation. All answers are treated in confidence and will only be used in the context that it is given and will not be used unethically by misinterpreting the responses. All participants will have access to the relevant section of the thesis to ensure they agree with the way their views have been represented. An example of the participant information sheets and consent forms are given in Appendix 6.10.

Interviewing both staff and students could introduce specific ethical issues. The boss (researcher)/sub-ordinate relationship could cause power concerns, as identified earlier but an inclusive management style ensures this will not an issue. The researcher/student relationship could cause bias where students are already known to the researcher. If bias is introduced as a result of the researcher’s conflict of interest then the research design, method of data collection, analysis and conclusions could be jeopardised and ultimately declared invalid (Loue, 2000). By adhering to the principles and advice laid down by BERA, as indicated earlier, the research conforms to good ethical practice. This is confirmed by approval of the research proposal through the Faculty Research Ethics Panel at Anglia Ruskin University.

6.7 Reliability and validity of the data

According to Fellows and Liu (1997, p.135) 'reliability concerns the consistency of measure …' whereas 'validity concerns how well a measure does measure the concept it is supposed to measure'. With qualitative research, where the data is obtained through conversations with participants, reliability can be problematic, as it is not seen as being objective as is the case with quantitative research. Would the participants respond in the same way to one researcher as another and would the response be the same at different times (Turner, 2005). A sample, by its very nature is only a representation, at a snapshot in time of a wider population; hence 'the findings are valid for the subject data only' (Fellows and Liu, 1997, p.136).

For this investigation it is important to explore the anecdotal evidence and to seek a widest possible range of opinions across a broad spectrum of topics. 'By combining multiple observes, theories, methods and empirical materials, researchers can hope to overcome the weaknesses or intrinsic biases and the problems that come from a single method, single-observer and single-theory studies' (Sachdeva, 2009, p.183). Mixed methods research provides an opportunity to draw on multiple data collection methods and quantitative and qualitative data analysis techniques bringing together several different perspectives on the evidence provided. The reliability of the study can be improved by triangulation in its various forms (Ihantola and Kihn, 2011). Triangulation is seen as an important part of the validation process to ensure the research is 'fit for purpose' by analyzing a research question from multiple perspectives.

Of interest to this research are internal and external validity in a quantitative research context and contextualized and, generalizability and transferability in a qualitative research context. Internal validity is concerned with ensuring that 'any conclusions we draw are solidly based' (Bechhofer and Paterson, 2000, p.18). In qualitative research, internal validity is achieved by ensuring that there is 'logic between a piece of research and existing theory' (Ihantola and Kihn,

2011, p.5). For the questionnaire, which generally follows a quantitative approach, validity is achieved by ensuring a good research design and eliminating bias through the way the questions are worded, phrased or located within the questionnaire. The researcher has to also ensure that the data analysis techniques used and the way the data is interrogated is valid.

External validity is a key component of quantitative research. How does the data allow for more general and wide observations to be made? Ensuring that the sample size is appropriate and it is a random sample of the target population will ensure external validity of the study.

In qualitative research, contextualised validity refers to the credibility of the responses provided and ensuring the responses accurately reflect the points being made. By interviewing a random sample of higher-level personnel and asking the right questions in a non-biased way helps ensure that the responses provided are valid. Recording the interviews and having the transcripts checked and approved by the higher-level personnel minimized the threats to the context of the data due to misrepresentation ranging from a 'lack of descriptive validity of settings and events' (Ihantola and Kihn, 2011, p.7).

Generalizability and transferability validity in qualitative research are important concepts and are concerned with ensuring the researcher has related the findings of the data collection methods, e.g. structured interviews, with theory and how new evidence 'enhances our understanding of the research question' (Ihantola and Kihn, 2011, p.8).

The suggestion that 'academic study should link more closely with the workplace' needs evidence to ensure its validity. Through a process of triangulation, defined by Biggam (2008, p.101) as occurring 'when you use different sources of data to get a range of perspectives … and so achieve a more robust picture', the reliability of the data and the process of gathering it increases. It serves to collaborate the data from different sources, thus minimizing bias and increasing the perceived quality of the research. The downside is that it is time-consuming and as Thurmond (2001, p.256) points out

can cause ‘disharmony based on investigator biases because of theoretical frameworks, and lack of understanding about why triangulation strategies were used’. A positivist and phenomenological approach will allow triangulation of the same phenomena to be made (Amaratunga et al., 2002). Providing feedback loops enhances the qualitative-quantitative continuum. Data collected through a quantitative study follows the qualitative-quantitative continuum approach if the research question has been determined through interviews. The qualitative foundations can enhance the project (Jha, 2008, p.50).

As part of the data gathering process, a questionnaire to final year built environment students at Anglia Ruskin University on how the students learn and apply knowledge in a workplace setting asks whether ‘professional practice is explained during their course’. The students’ response (82% full time and 72% part time) indicates clearly that professional practice is emphasised during their study, however they do not fully relate theoretical mode 1 knowledge to tacit mode 2 knowledge.

The response from higher-level personnel and final year students suggests that students would benefit from a period of WBL, but is this truly valid? Internal validity may have been satisfied, but what about external validity, where the researcher allows ‘valid generalisation to other times and places’ (Bechhofer and Paterson, 2000, p.18). To help ensure validity for qualitative research design, Jha (2008) has drawn up a list of criteria, based on the work of Guba and Lincoln (1982; 1989), Goetz and LeCompte (1984) and McMilan (1992), which the researcher can use to probe the validity of the methods employed. Within the investigation, the eleven criteria identified by Jha (2008, pp.122-125) as good practice for qualitative data collection have been implemented as follows:

1. Neutrality

The aim is to ensure objectivity in the data. All participants have to consent to be involved in the research and the Faulty Research Ethics Panel (FREP) at Anglia Ruskin University approves all methods of data collection prior to it

taking place. Objectivity is maintained in the research samples chosen as identified earlier in the chapter.

2. Prolonged engagement on-site

The questionnaire to final year students has 15 questions and can be completed in 15 – 20 minutes. The majority of questions require a single response, some on a Likert scale. The structured interviews to higher-level personnel are scheduled to last for approximately 30 minutes but participants can have longer if needed.

3. Persistent (consistent) observation

Each structured interview to higher-level personnel is conducted in exactly the same way with the same set of questions and the same pre-amble before the interview.

4. Peer de-briefing

All of the questionnaires, recorded higher-level personnel interviews and focus groups are available for the researcher's first and second supervisors to view.

5. Triangulation

A variety of different sources of quantitative and qualitative data (questionnaires, structured interviews, focus groups) have been obtained to ensure consistency.

6. Member checking

The interpretation of the data is continually checked which gives the participant an opportunity to show understanding and determine what the researcher intended to do through their actions. Transcribed interviews are sent to higher-level personnel and focus group participants for accuracy, which adds credibility

and validity to the process. There is a risk that the researcher's own view of reality will be evident in the transcription and confirmed by the respondent, when in fact it may not be true or certain.

7. Referential materials

As identified in item 5, a variety of different sources of data collection are used.

8. Structural relationships

Structured relationships are identified in and between data sets; and thematic statements obtained which can be analysed in relation to the published literature.

9. Theoretical sampling

The data obtained from both the student questionnaire and structured interviews to higher-level personnel provides a supportive and collaborative interpretation of existing theory whilst supporting emerging theory.

10. Leaving an audit trail

All data is stored electronically in line with the Data Protection Act, 1998 and a full audit trail is left so that another researcher, if required can replicate the research.

11. Generalizability

Generalisation is not the norm amongst qualitative researchers and as Jha (2008) points out, is 'in violation of basic assumptions of naturalistic philosophy.' Generalisations have been made with quantitative data though statistical tests but are less prevalent with the qualitative data from the structured interviews to higher-level personnel.

The concept of validity can be a difficult one for the reader to grasp, but good research design will generate dependable data that can ensure reliable results (Sachdeva, 2009). Reliability or dependability refers to the same result being produced over and over again. It is a means of 'repeatability or consistency' (Sachdeva, 2009, p.69). As identified earlier, this can prove challenging with qualitative data. The research could be seen as being unscientific, not easily replicated and it lacks generalizability. The personal nature of the research means that if another researcher undertook the same qualitative research, different conclusions may be achieved (Gray, 2009, p.189). Reliability will be improved through triangulation.

The aim of the research is to ensure data collected is both reliable and valid. In fact, as Sachdeva (2009, p.71) points out, 'reliability and validity are not separate ideas but in fact they are related to each other.' The researcher has taken responsibility for ensuring that the investigation is designed and planned appropriately. The research proposal identifies the research strategy and rationale. A thorough literature review has been identified with significant contributors in the areas of how students learn and apply knowledge, PDP, WBL and professional competence.

The data collection process is robust and through questionnaires (current students and staff at Anglia Ruskin University, and pathway leaders at universities offering a BSc Construction Management course), structured interviews (higher-level personnel) and focus groups (current/past students at Anglia Ruskin University, academic staff at Anglia Ruskin University and higher-level personnel) the perceived realities of what is needed to develop an integrated model of PDP and WBL to enhance traditional academic theory is captured. Methods of data presentation and analysis lead to the creation of trustworthy statements which support/defend/disagree with published research. This leads to the formation of defendable conclusions and recommendations for further research.

6.8 Data preparation and analysis

The research uses three methods of data collection: questionnaires, structured interviews and focus groups to gather evidence against the five research objectives. Data preparation is vital but it does not start once the data has been collected (Wynn, 2012). The selection of statistical tests, for instance should have been thought about at the planning stage, not implementation stage of the research (Gray, 2009, p.449). The raw data is analysed to search for patterns, provide information about variables and the relationships between them, and to aid understanding (Fellows and Liu, 1997, p.144).

6.8.1 Questionnaires

Once the questionnaires are returned the data can easily be transcribed and put into an Excel spreadsheet, however as Bell (2005, p.201) points out 'data collected by means of questionnaires, interviews, diaries or any other method mean very little until they are analysed and evaluated'. All questionnaires are filed to enable fresh analysis if necessary.

The majority of the questions on all of the questionnaires required a single response and are quantitative in nature. However a small number of questions require the respondents to express an opinion, which are qualitative in nature. To analyse qualitative questions, codings are used and key themes emerging from the data are identified.

Quantitative measures, incorporating averages and percentages of respondents' answers to questions, are used. The results are presented in the form of tables, bar charts, pie charts and graphs. In addition to the descriptive statistical method of analysis, statistical tests are used.

The Statistical Package for Social Sciences (SPSS) was considered to analyse all of the quantitative data. This would enable the researcher as Bell (2005, p.203) states 'to look for similarities and differences, for groupings, patterns and

items of particular significance'. SPSS is a sophisticated package but it is not 'user friendly' (Information Technology Service, 2010) and it is felt by the researcher that Microsoft Excel 2010 with StatPlus:mac, a statistics package is more than suitable to collate and analyse the majority of the data. This method of data analysis is chosen because it is familiar to the researcher and provides a powerful tool with which to provide a comprehensive analysis. Data is input into Excel, question by question, for each respondent and a coding system adopted which allows for an appropriate level of analysis in the majority of cases to be carried out. SPSS is used where more sophisticated analysis is needed e.g. non-parametric Mann-Whitney and Kruskal Wallis tests.

6.8.2 Interviews

Each interview is recorded and the recording transcribed. The transcription is sent to the interviewee to establish that it is a true and accurate record of the interview. Once approval had been sought, the transcription is entered into Microsoft Word and Microsoft Excel. This allows the researcher to easily organise and analyse the unstructured data. The Nvivo10 qualitative and mixed methods research package is considered, but it is discounted because the learning curve is very time consuming and manual equivalencies of the MS Office Suite of Word and Excel with other software packages of Wordle (for word clouds) and Freemind (special outlining) provide a viable alternative. Nvivo10 does have useful facilities for linking extracts of data together however manual coding and electronic analysis of data can be done with Word and Excel.

The data obtained is qualitative in nature and as Fellows and Liu (1997, p.140) point out 'can be difficult and laborious to analyse'. To ensure objectivity and to exclude the researchers opinions in the analysis, a set of guidelines is drawn up to ensure the data is categorized appropriately and through a process of 'thematic analysis', emerging ideas/themes can be established. Thematic analysis is more appropriate than content analysis as it considers the qualitative aspects of the data rather than establishing a numerical description of the key

features pertaining to the data (Joffe and Yardley, 2004). All themes emerging from the data can be explored or a selective approach adopted by only considering those ideas, which are related to a particular research interest (Ball, no-date).

Fellows and Liu (1997) indicate caution with the categorization of qualitative data as it can distort or become part of the analysis. This view is shared by Alexiadou (2001, p.53) who indicates that it is difficult to find 'a set of theoretically informed procedures in analysing data, that enabled an understanding of "lived experience" and the "discovery" of meaning behind the talk provided by the interviewee, while at the same time allowing the exploration of language as it performs a social function'. Thematic analysis allows the researcher to determine the frequency of the ideas yet analyse in context their meaning (Joffe and Yardley, 2004).

The procedures suggested by Alexiadou (2001) are set out for semi-structured interviews but provide a comprehensive process by which structured interviews can be captured, analysed and the content disseminated to a wider audience. A central aim of the process is to make sure there is consistency across the interviews and validity of the analysis procedure.

6.8.2.1 Presenting and analysing the data

The purpose of this section is to explain how the data from the higher-level personnel interviews is sorted, presented and what process took place in relation to the analysis of responses received. The data analysis is split into two sections. The first section is concerned with a presentation and analysis of the answers that were given in relation to the questions that were asked and the second section is concerned with an analysis of emerging ideas, which the researcher identified as being critical features of the data.

In presenting and analysing the answers to the structured interview questions, the investigation includes qualitative data in order to produce a balance view of

respondent's thoughts and opinions. Selected higher-level personnel responses are included in the text with detailed reference to an example of complete responses in the appendices.

To identify the emerging themes from the data and to establish and interrogate the relationships between them, the interviews are de-constructed. This took place using the framework (eight stages of analysis) suggested by Alexiadou (2001) and interpreted by Taylor (2009) as being:

Stage 1 – Achieving familiarity with the data
Stage 2 – Recognising significance
Stage 3 – Sorting the data into ideas/themes
Stage 4 – Clustering the themes together to make order of the data
Stage 5 – Make sense and unravel meaning to the data
Stage 6 – Read back over each theme/cluster to ensure full coverage
Stage 7 – Interrogate the data to establish relationships
Stage 8 – Generate individual accounts

The eight stages of analysis are considered in conjunction with those proposed by Taylor-Powell and Renner (2003), which are:

Step 1 – Get to know your data
Step 2 – Focus the analysis
Step 3 – Categorise information
Step 4 – Identify patterns and connections within and between categories
Step 5 – Interpretation, bringing it all together

For the purpose of this research, the investigation combines the information from Alexiadou (2001), Taylor (2009) and Taylor-Powell and Renner (2003) to analyse the qualitative data using the following six stages:

1. Demonstrating an understanding and insight into the data
2. Establishing critical features within the data and sorting into emerging ideas
3. Group like-minded ideas/themes together into thematic clusters
4. Identify relationships within and between the clusters making sense of the information
5. Interrogate the relationships and interpret the themes
6. Draw conclusions and verify outcomes

The six stages are an iterative process, moving from 'field text to research text' (Taylor, 2009, p.124) to enable order and sense to be made from the data. Themes capture reoccurring ideas, which can be analysed in relation to the research question. Chapter 7 presents the results of the structured interviews.

Stage 1 – Demonstrating an understanding and insight into the data

It is important at this stage to understand the data and become familiar with its content. This involves listening to the interview, transcribing its content and re-reading the transcript several times, going back to the recording where words, phrases, sentences do not make sense and then editing the text. The transcription of each interview is laid out so that each answer clearly follows each question that was asked. This ensures consistency across all interviews.

Stage 2 – Establishing critical features within the data and sorting into emerging ideas

Once each transcription has been edited and a final version achieved and approved by the respondent, the researcher is able to take higher-level personnel (respondent) responses and group them together for each questions. To enable critical features in the data to be established, the researcher first underlines significant words in the question.

Question:

The respondents view on whether they are a professional and if so, why?

This enables a 'train of thought to be present' when reading the text, so that emerging ideas can be determined. The researcher then underlines significant words in the text related to the underlined word(s) in the question.

Response:

I would describe myself as a professional. I don't associate that purely with having a professional qualification. I believe my actions in managing the operations of the business are done on a professional basis and I represent the business and I also provide leadership and support to the staff and by my actions look to demonstrate how they should conduct themselves.

Examples of the transcribed interviews are presented in Appendices 7.5 and 7.7 with higher-level personnel responses shown against the questions that were asked during the interview. An initial sorting of the data reveals 167 emerging ideas, which are collated together into one list (Appendix 7.8).

Emerging ideas:

Actions
Leadership
Role models
Specialists

Stage 3 – Group like-minded ideas/themes together into thematic clusters

A shorter list of 106 emerging ideas evolves by reading and re-reading the collated sections and grouping like-minded words/phrases together to produce a revised list of emerging ideas (Appendix 7.9). The emerging ideas are grouped together into five like-minded areas (Appendix 7.10). Each area has a particular theme e.g. role models is put into the 'work' cluster as it emanated from a work context with the comment '*my actions look to demonstrate how*

they should conduct themselves' suggesting that the respondent sees himself as a role model. This follows the process suggested by Alexiadou (2001, p.58) where the 'themes can be *in vivo,* namely directly, represented in a participant's talk or they represent the researcher's definition of what is "read" in the data'.

A coding system is introduced (Figure 6.5) to identify the data extracts, which are used in Section 7.3 to support the statements that have been made.

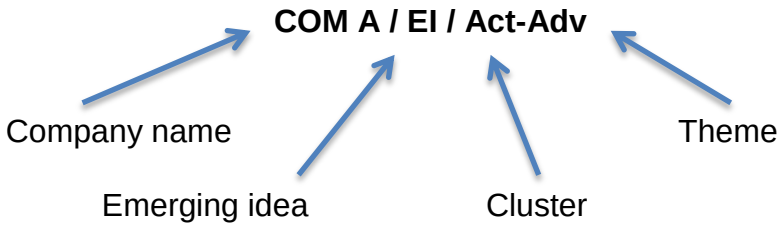


Figure 6.5: The data coding system

Question: Should a period of WBL be part of an academic award and if so, what should students get out of the workplace?

Response: *I would really embrace the opportunity for students to come in and spend 6 months or whatever in the workplace. I think it would turn their studies around.*
Emerging idea: Experience
Coding: COM I/EI/Wor-Exp

Stage 4 – Identify relationships within and between the clusters making sense of the information

The purpose of this stage is to ensure that the title of the thematic cluster fully represented the words or phrases contained within it and to make sense of the information. In the cluster 'personal', the title is expanded to 'personal (development, enhancement, performance, self)' as this provides a far greater overview of the content of the cluster. Within the cluster words such as 'attitude, confidence, desire, etc.' appeared with the cluster title being 'an adequate representation of the data' Alexiadou (2001, p.61).

The relative importance of the different themes within and between the clusters can be identified which leads to the linking together of inter-related clusters and establishing key points that need further explanation. The two highlighted examples are from different parts of the interview and different clusters but share the same theme of academia and industry working together to benefit the student's learning and development.

I think it's really essential part of development. On sandwich courses there are opportunities to take time out with an employer in the workplace and to apply some of the academic skills with the practical ones (Company A)*. I think that has to be the academics and business world working together* (Company B).

This gives a framework to then move to the analysis stage.

Stage 5 – Interrogate the relationships and interpret the themes

This stage allows the researcher to interrogate the data further and look for links between the themes and to ensure that any comments made are related to the research focus. Examples of responses are used to illustrate points made which adds meaning and significance to the analysis.

The evidence below shows how a higher-level personnel response is used to illustrate a point being made. *WBL was seen by all the respondents as being highly valued and all agreed that some form of WBL should be part of an academic course, so that the students can 'gain some experience on the job' (COM A/EI/Wor-ler) and 'it is tremendously important that people get out there – there's so much to learn' (COM E/EI/Aje-Wbl). As Miller (1990) highlights, the second stage of achieving professional competence is having the 'ability to apply that knowledge'.*

The five thematic clusters of 'actions, education, personal (development, enhancement, performance, self), work, and academic and industry engagement' provide an opportunity to 'relate themes back to original data, in

order to ensure adequate analytical coverage of the data' (Taylor, 2009, p.128). Within the thematic cluster 'academic and industry engagement' the emerging ideas of 'industry based projects' and 'informal and formal training' suggest there is an opportunity to engage employers in student projects in the workplace, thus preparing students for the world of work whilst contributing to an academic qualification.

Stage 6 – Draw conclusions and verify outcomes

The final stage allows the researcher to identify the main thrust of the higher-level personnel comments and to interrogate the comments in relation to the revised enhanced employability skills and competencies and the criteria used in the development of a model of PDP and WBL to enhance traditional academic theory.

The interviews provide data, which enable comment to be made against the research objectives.

- *Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.*
- *Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work.*
- *Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.*

The views from respondents demonstrate very clearly that academic study should link more closely with the workplace and an academic award should have a work-based element. Higher-level personnel went onto add that not all workplaces are suitable environments for learning and assessing in the workplace might be difficult.

A sound theoretical base is needed and once ideas/patterns have been established in the data, hypothesised relationships can be investigated and tested. The interviews allow for material obtained from the literature to be discussed with professionals in the workplace and ideas and thoughts that are generated, to be fed back to both staff and students through the focus groups.

6.8.3 Focus groups

There are numerous sources of focus group data yet the majority of researchers focus on what was said by each participant in their analysis (Onwuegbuzie et al., 2009). As with structured interviews, the preferred and most rigorous analysis occurs with transcribed data, but this is very time-consuming and in large groups difficult to obtain, hence the research using two smaller focus groups. Each focus group is recorded to capture the discussion and this is sent to each of the focus group members to establish that it is a true and accurate record of the focus group meeting. Seeking approval from each of the participants is time consuming because this has to be done more than once since changes made by one individual to the transcription has to be agreed by everyone. To ensure the main thoughts, ideas and opinions are not missed, each participant is also asked to write down using a bulleted list, no more than five comments for each of the seven areas (final draft 'super suite of employability skills and competencies', course structure diagrams, proposed model of knowledge and skills activity, skills and competencies matrix, links between the modules, module definition forms for the proposed new modules, mapping of modules to the CIOB Education Framework) identified on the briefing sheet. Each focus group is then asked to identify the single biggest issue related to each of the seven points. The recorded data and written data are combined and analysed as a whole. The analysis takes into account the data that is generated through the interaction of the participants (Pope and Mays, 2006, p.26). Noting what is not said, through facial expressions, etc. also gives important data. Finally, it is important to ensure consistency is achieved across each focus group (HSE, no-date), which is done by careful preparation,

informed briefing of the participants and an understanding of the role of the facilitator.

The focus groups allow for a wide variety of views to emerge at one time unlike the structured interview where several interviews will need to take place before the same outcome is achieved. Group dynamics also enables the stimulation of new ideas, however unexpected comments may arise (Gray, 2009, p.233). Like the structured interviews, the transcription is entered into Microsoft Word and Microsoft Excel, which allow the researcher to easily organise and analyse the unstructured data.

6.8.3.1 Presenting and analysing the data

To analyse the qualitative data, several approaches can be used to extract, describe and explain the findings. Inductive methods (thematic analysis) gradually extract categories from the data whereas deductive methods (framework analysis) start from the aims and objectives set out for the study. Methods including grounded theory contain interactive and deductive approaches (Pope and Mays, 2006). The data is presented and analysed in two sections. The first section is concerned with a presentation and analysis of the transcribed discussions and written bulleted lists. The second section is concerned with a thematic analysis of key themes between different areas in each focus group, between the same area in different focus groups and between different areas in different focus groups. The process is illustrated in Figure 6.6 below with three colour coded examples demonstrating the emergence of themes.

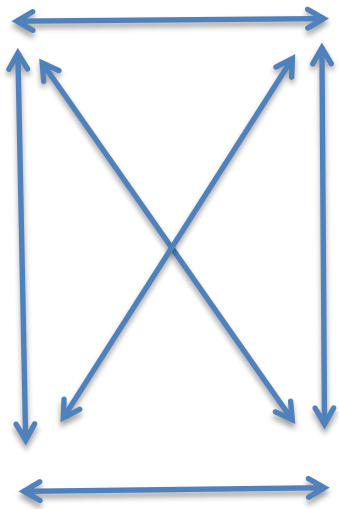
Focus Group 1

Area 1 – Final 'super suite of employability skills and competencies'

- Favouring personal attitudes and attributes as column 1.
- Should cover soft skills at university and look at professional skills, which the super suite addresses.

Area 2 – Course structure diagrams

- Surveying should be retitled Site Engineering Surveying.
- Soft skills should encourage reflection of the situation before making rash judgments.



Focus Group 2

Area 1 – Final 'super suite of employability skills and competencies'

- The heading 'personal attributes' might be less subjective if employers refer to employees' individual personalities as opposed to their attitude in an interview.

Area 2 – Course structure diagrams

- Since the module site and engineering surveying has gone, some content will need to be included in the surveying module.

Figure 6.6: Process of thematic analysis between areas and focus groups

Example 1 – Personal Attributes

This theme emerges through Focus Group 1, Area 1 comments and Focus Group 2, Area 1 comments.

Example 2 – Soft skills

This theme emerges through Focus Group 1, Area 1 comments and Focus Group 1, Area 2 comments.

Example 3 – Surveying

This theme emerges through Focus Group 1, Area 2 comments and Focus Group 2, Area 2 comments.

6.8.4 Statistical methods used

Sachdeva (2009, p.195) indicates that 'the main purpose of statistics is to accurately summarise the data into easily interpretable fewer numbers', whereas Clarke and Cooke (1992, p.1) identify statistics as 'the science that studies the collection and interpretation of numerical data'. Both these definitions refer to data being transformed into information that can be easily understood and subsequently used to inform the reader of salient points from the data set.

There are many statistical tests available to the researcher and the one chosen depends on 'the scientific question to be answered, the data structure, and the study design.' (du Prel et al., 2010, p.344). The flow chart given in Figure 6.7 indicates the appropriate tests, which can be used to compare data from different groups e.g. full and part time students.

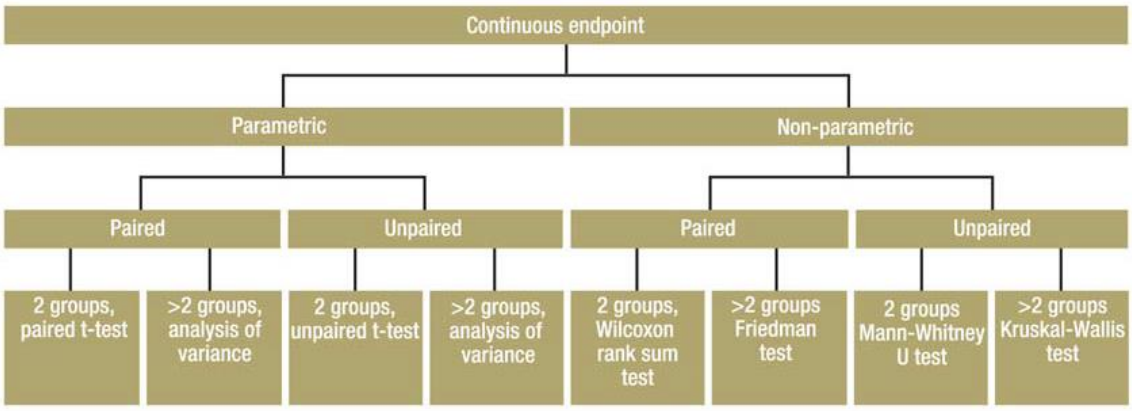


Figure 6.7: Flow chart for the selection of group comparisons (Source: du Prel et al., 2008, p.346)

The data obtained through the questionnaire to students is discrete, that is 'data that increases in jumps … – from 0 to 1, 1 to 2, etc. ... fractions of a unit are impossible' (Harper, 1989, p.84). It follows a nominal (can be put into categories) and ordinal (can be ordered or ranked – it is quantifiable) scale. Where Likert scale questions are used (questionnaire to students on how they

learn, questions 1, 2, etc.), with five possible levels of response, there is debate on whether parametric or non-parametric tests can be used. Work by Murray (2013, p.259) analysed the comments made by Norman (2010, p.631), which suggests that 'Parametric statistics can be used with Likert data, with small sample sizes, with unequal variances, and with non-normal distributions, with no fear of coming to the wrong conclusion'. This opposed the view of Gardiner and Martin (2007) and Jamieson (2004) who feel that only non-parametric tests should be used since the Likert data is not ordinal. Murray (2013) concludes that the use of certain parametric and non-parametric tests carried out on the same data will have no adverse bearing on the conclusions drawn from the results. Mendenhall, Reinmuth and Beaver (1993) point out that if the researcher is using parametric tests, the distribution should be checked to make sure it is mound shaped i.e. follows a normal distribution. Gray (2009, p.473) goes on to indicate that 'if the data are not normally distributed then usually a non-parametric test' should be used.

For parametric data, T tests and z tests can be used out to compare means between groups (which test is used is dependent on sample size), however it is worth noting that in order to use a t test the students' data (sampled population) should follow a normal distribution (Mendenhall, Reinmuth and Beaver, 1993). Since the data does not follow a normal distribution it is concluded that the data is non-parametric (du Prel et al., 2010). Using Figure 6.7 above and 'where subjects in both groups are independent of each other (persons in first group are different from those in second group) the Mann-Whitney U test (also known as the Wilcoxon rank sum test) can be used for the comparison of a non-normally distributed, but at least ordinally scaled, parameter in two unpaired samples' (du Prel et al., 2010, p.346). The test is performed using the null hypothesis (Ho), that there is no significant difference between the two medians for full and part time students and the way that students learn.

The analysis of qualitative data tends to be more difficult than quantitative data since it is descriptive in nature and requires participants to provide accurate descriptions. It can however, be converted into quantitative data by putting it into units and assigning each unit a numerical value. Specific hypothesis can

be examined through a numerical analysis of these values (McLeod, 2008). For this research project, the qualitative data from higher-level personnel is analysed using thematic analysis.

Correlation analysis is used to measure the closeness of the relationship between two variables (Harper, 1989) with the Spearman Rho test used on the non-parametric data. Correlation analysis is used to test the significance of the relationship between those students who opted for definitions of learning L3 (The individual process of constructing understanding based on experience from a wide range of sources) as well as L4 (Learning is the lifelong process of transforming information and experience into knowledge, skills, behaviours and attitudes).

Table 6.11 relates the information from Cohen, Manion and Morrison, (2013) on statistical tests to this research project.

Table 6.11: Statistical tests applicable to the research project

Method of data collection	Type of data	Statistics chosen	Reason for choice
Questionnaires Students (Sample of final year Built Environment students at Anglia Ruskin University)	***Quantitative*** Non -parametric Nominal, ordinal	Nominal data questions (mean, mode and median, frequency)	Data is obtained which simply denotes categories or groups. Descriptive statistics. Only one sample.
Built Environment pathway leaders (Sample of UK universities offering a BSc Construction Management course)		Ordinal data questions (mean, mode, median, frequency, Mann-Whitney U test on un-paired samples)	Data is obtained using a rating or Likert scale thus adding order to the data. Descriptive statistics.
		Linear Correlation (Spearman Rho and Kendall's-Tau[b] test of concordance)	Used to measure the closeness of the relationship between two variables.
Students (Sample of construction management students at Anglia Ruskin University)	***Qualitative***	Thematic analysis	Enables predetermined categories to be counted and measured (textual investigation).
Interviews Higher-level personnel (Sample of higher-level personnel within the construction industry)	***Qualitative***	Thematic analysis	Enables predetermined categories to be counted and measured (textual investigation).
	Quantitative Ordinal	Ordinal data questions (mean, mode, median, frequency)	Data is obtained using a rating or Likert scale thus adding order to the data. Descriptive statistics.
Focus Groups Staff and students (Construction Management/Built Environment staff and students at Anglia Ruskin University)	***Qualitative***	Thematic analysis	Enables predetermined categories to be counted and measured (textual investigation).
Higher-level personnel (Sample of higher-level personnel within the construction industry)	***Quantitative*** Ordinal	Ordinal data questions (mean, mode, median, frequency)	Data is obtained using a rating or Likert scale thus adding order to the data. Descriptive statistics.

6.9 Chapter summary

The aim of this chapter has been to present the conceptual framework through which the research aim and objectives will be met. Mixed methods research following a survey-based methodological approach is used, which is split into three inter-related areas: PDP, WBL and professional competence.

Ethical issues are discussed and the role and conduct of the researcher is outlined in the context of ensuring the research is free from bias and remains valid. The importance of 'insider-research' is highlighted and measures stated to ensure objectivity is maintained.

Data is collected through questionnaires to final year built environment students at Anglia Ruskin University, and built environment pathway leaders at UK universities offering a BSc Construction Management course. Structured interviews take place with higher-level personnel in the construction industry. The results of these methods of data collection are presented in Chapter 7.

The questionnaire to students mainly generates quantitative data, which is analysed using Microsoft Excel, StatPlus:mac and SPSS. The structured interviews to higher-level personnel first took place with a preliminary study, which informed the subsequent study. A representative sample of the construction industry is identified from organisations that the researcher had dealings with during his 30 years of professional life. Data from the UK Standard Industrial Classification of Economic Activity and the Office for National Statistics is used to determine the selection criteria for the companies.

The subsequent study interviews focus on only three learning areas covering similar information to the preliminary study. The areas are reduced from four to three as it is felt there is some repetition of information being represented within the preliminary study questions. The new three areas of questioning are:

- Background information
- Importance of academic study, PDP, professional skill development and WBL
- Competence, capability and professional status

The interviews provide a substantial amount of useful data with the aim of the data gathering process having been achieved with data that is both reliable and valid.

Two focus groups consisting of higher-level personnel specific to construction management, recent graduates from the Department of Engineering and the Built Environment at Anglia Ruskin University, academic staff and current construction management students in the Department of Engineering and the Built Environment at Anglia Ruskin University provide meaningful data on the information below:

- Final 'super suite of employability skills and competencies'
- Course structure diagrams (existing and proposed BSc Construction Management course)
- Proposed model of knowledge and skills activity
- Skills and competencies matrix
- Links between the modules
- Module definition forms for the proposed new modules
- Mapping of modules to the CIOB Education Framework

The chapter identifies the rationale for the use of statistical tests and these are presented in Table 6.11 related to each of the methods of data collection. It is assumed the non-parametric data obtained from the questionnaires is not normally distributed. Thematic analysis is used in the analysis of qualitative data and the results of these investigations are shown in Chapter 7.

7.0 Results, Analysis and Discussion

7.1 Introduction to the chapter

The purpose of this chapter is to present the results from the three methods of data collection: questionnaires, structured interviews and focus groups. The chapter provides a detailed analysis of these results and discursive critical comment against the findings in the literature. The results are presented later in the chapter against the five research objectives.

Section 7.2 focuses on the results of the questionnaire to final year built environment students on how and why they learn, how they apply the knowledge gained and whether they reflect on their learning. This data is used to answer the first research objective. In Section 7.3 the views from higher-level personnel obtained through structured interviews provide data with which to answer research objectives 2, 3 and 4. Higher-level personnel provide critical comment on the importance of academic study, PDP, professional skill development and WBL.

Section 7.4 focuses on the use of a questionnaire to final year built environment students, which sought to answer the second research objective and establish students' views on PDP, skill development, ethics and professional responsibility. A questionnaire to construction management students covering the 'super suite of employability skills and competencies' provides useful data against the first research objective. The views of built environment pathway leaders at UK universities offering a BSc Construction Management course are presented in Section 7.5 on the third research objective and whether WBL can contribute to an academic qualification.

Section 7.6 focuses on the development and testing of criteria for a model integrating PDP and WBL to enhance traditional academic theory. The model is based on the 'super suite of employability skills and competencies', evidenced from the literature and extensive data collection.

7.2 How students learn and apply knowledge in a workplace setting

7.2.1 Results of the student questionnaire

The results of the questionnaire to Anglia Ruskin University undergraduate Built Environment final year students are presented below. Figures 7.1 and 7.2 show a breakdown of the student groups who took the survey (53% of final year students – 165 students).

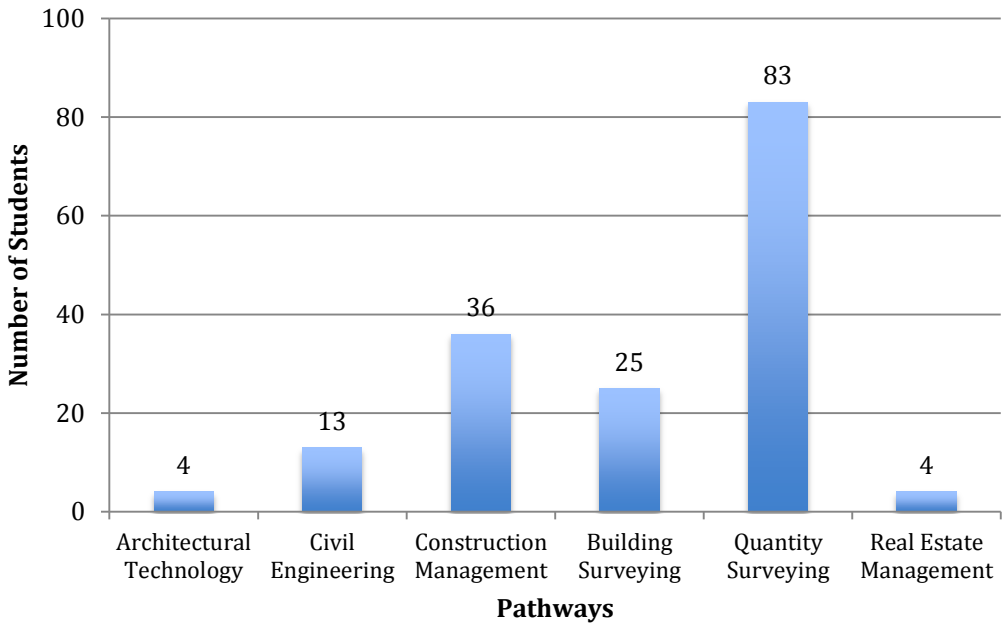


Figure 7.1: Pathways to which students are registered

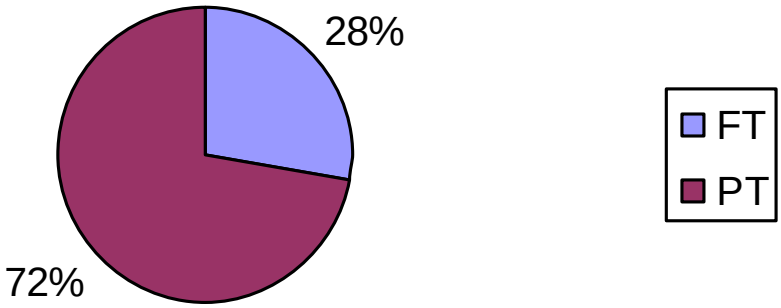


Figure 7.2: Breakdown of students by mode of study

The largest group taking the survey is Quantity Surveyors who accounted for 50% of respondents. This is not surprising as they account for 35% of undergraduate students in the Department of Engineering and the Built Environment, by far the largest discipline in the department. The majority of respondents are part-time, which may have a significant bearing on the responses and comments obtained.

The first question is used to identify the ways in which students learn and how important the eight ways of learning are to them. The central tendency of the mean average response for each way of learning is indicated in Figure 7.3.

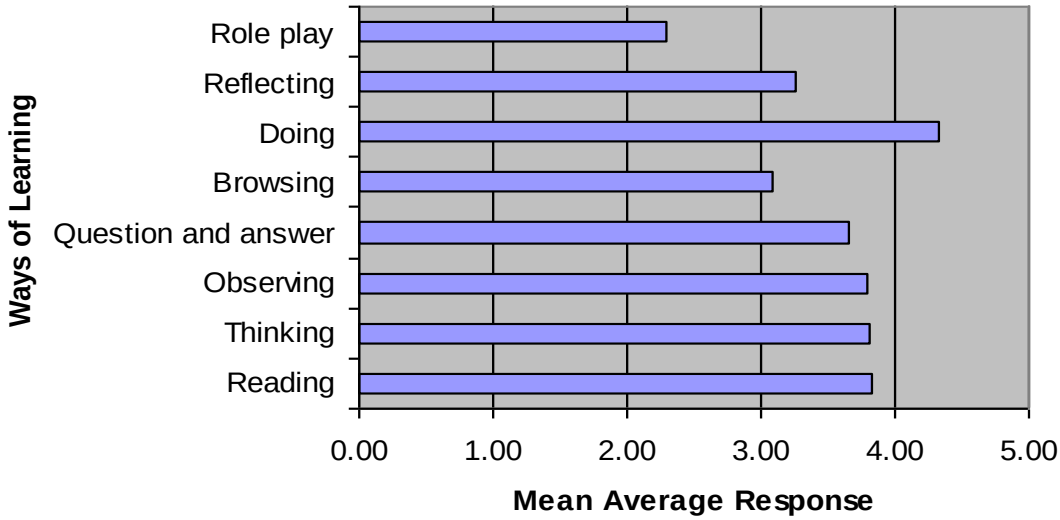


Figure 7.3: Preferred ways of learning

The most preferred way of learning (4.33 mean average) is learning by doing and the least preferred way of learning (2.30 mean average) is role-play. The same result of most and least preferred ways of learning exists by using the mode average results, which is shown in Table 7.1.

Table 7.1: Number of responses to establish the mode average

Ways of learning	**1**	**2**	**3**	**4**	**5**
Reading	3	12	4	61	46
Thinking	4	11	39	66	43
Observing	1	13	48	60	42
Question and answer	1	14	56	63	30
Browsing	4	44	64	35	16
Doing	1	4	15	64	80
Reflecting	6	27	61	57	11
Role play	44	51	46	17	4

On reflection, students should have been given a ninth category of 'other' so that they could have specified their own way of learning, if required.

The students preferred ways of learning are then grouped into study mode (FT/PT) and the following hypothesis is drawn for validation.

1. **$H_{1\text{-main}}$**:
   There are statistically significant different ways of learning between full time and part time students. Learning approaches adopted by full time students are statistically different to that of part time students using the null hypothesis (Ho) that there is no significant difference at the 5% level.

To test the hypothesis, separate null hypotheses for each learning style are drawn and compared between pairs of independent samples using non-parametric tests such as Mann-Whitney U test and Kruskal Wallis. Non-parametric tests are suitable for the data as it is in an ordinal scale of measurement (Hill and Lewicki, 2007). The Mann-Whitney test can objectively measure movements among paired variables without requiring the data to be normally distributed or the link to be represented by a linear relationship (Henjewele, Sun and Fewings, 2014).

Test hypotheses for the main hypothesis 1 ($H_{1\text{-main}}$):

- **H_{01}**: Pairwise comparison of median (critical U values) for Reading is identical for both FT and PT students
- **H_{02}**: Pairwise comparison of median (critical U values) for Thinking is identical for both FT and PT students
- **H_{03}**: Pairwise comparison of median (critical U values) for Observing is identical for both FT and PT students
- **H_{04}**: Pairwise comparison of median (critical U values) for Question and Answer are identical for both FT and PT students
- **H_{05}**: Pairwise comparison of median (critical U values) for Browsing is identical for both FT and PT students

H_{06}: Pairwise comparison of median (critical U values) for Doing is identical for both FT and PT students

H_{07}: Pairwise comparison of median (critical U values) for Reflecting is identical for both FT and PT students

H_{08}: Pairwise comparison of median (critical U values) for Role-play is identical for both FT and PT students

Test results

A summary of the results is presented in Table 7.2 with most of the hypotheses validated. Additional data from SPSS is presented in Appendix 7.1.

Table 7.2: Summary results for pairwise comparison of ways of learning between full time and part time students - Mann-Whitney's U-test

Test Hypothesis	Ways of learning	Mean ranks		U-statistics	Sig
		FT	PT		
H_{01}	Reading	79.17	80.33	2527.500	0.880
H_{02}	Thinking	89.20	76.37	2151.000	0.096
H_{03}	Observing	96.59	73.45	1818.500	**0.003**
H_{04}	Q & A	78.51	80.59	2498.000	0.787
H_{05}	Browsing	93.87	74.53	1941.000	**0.013**
H_{06}	Doing	84.71	78.14	2353.000	0.372
H_{07}	Reflecting	88.34	76.71	2189.500	0.131
H_{08}	Role play	85.03	78.01	2338.500	0.368

The two hypotheses below are not validated:

H_{03}: The pairwise comparison shows no statistically identical medians between full-time and part-time students (**$\rho<0.01$**). The results suggest that observing is more important to full time students (mean rank = 96.59) than to part-time students (mean rank = 73.45).

H_{05}: The pairwise comparison shows no statistically identical medians between full-time and part-time students (**ρ<0.05).** This suggests that browsing is more important to full-time students (mean rank = 93.87) than part-time students (mean rank = 74.53).

Although the difference is conclusive only for 'observing' and 'browsing', a cross-examination of mean ranks further suggest that full-time students rated observing and browsing higher than other learning methods, while part-time students rated reading and question and answer higher than other learning methods.

A further hypothesis test is carried out on the durations (linked to credits studied) students have spent at Anglia Ruskin University. The information and results are presented in Appendix 7.2.

The preferred way of learning (mean average) is also established for each course group. The results are presented in Figure 7.4.

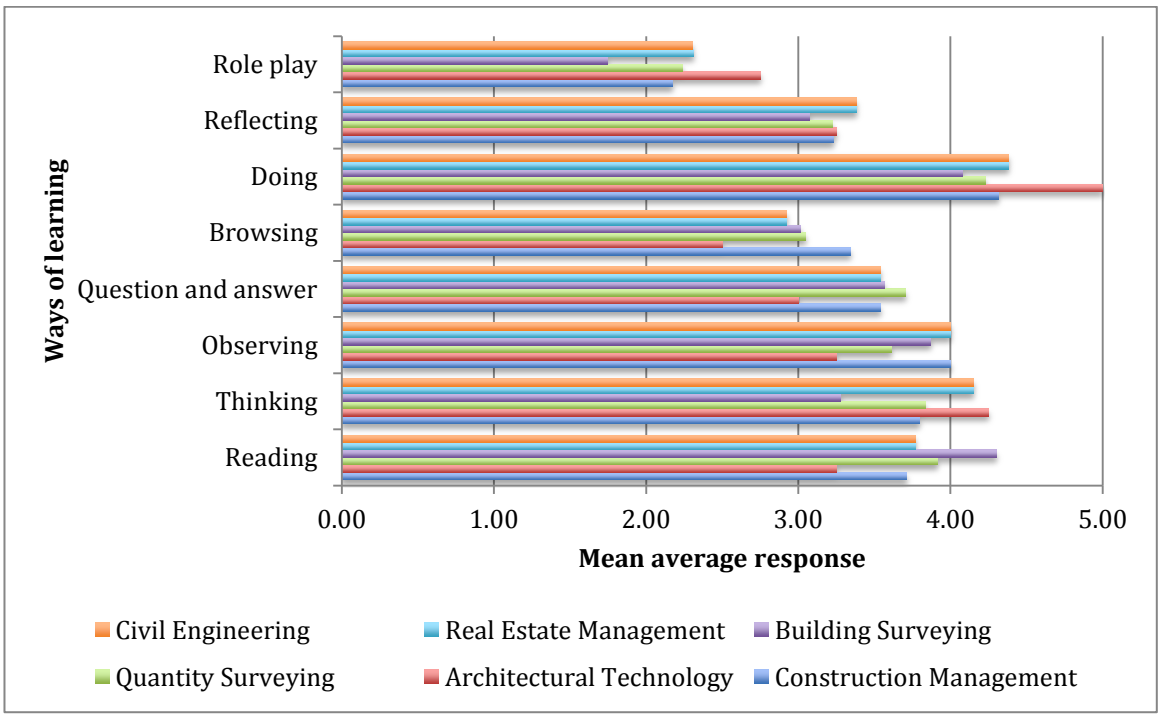


Figure 7.4: Preferred ways of learning by course

The data shows 'doing' as the preferred way of learning for each course group except building surveying, which is reading. There is no particular reason why building surveying students should be any different than other built environment students. The majority of the students are part-time as is the case with construction management and quantity surveying students.

Question 2 focuses on the importance of the learning environment (Figure 7.5). The top three learning environments identified by all the students with the largest differentiation between that learning environment being very important (VI) and not being important (NI) are learning through work (80 responses difference), tutorials (63 responses difference) and the Internet (60 responses difference).

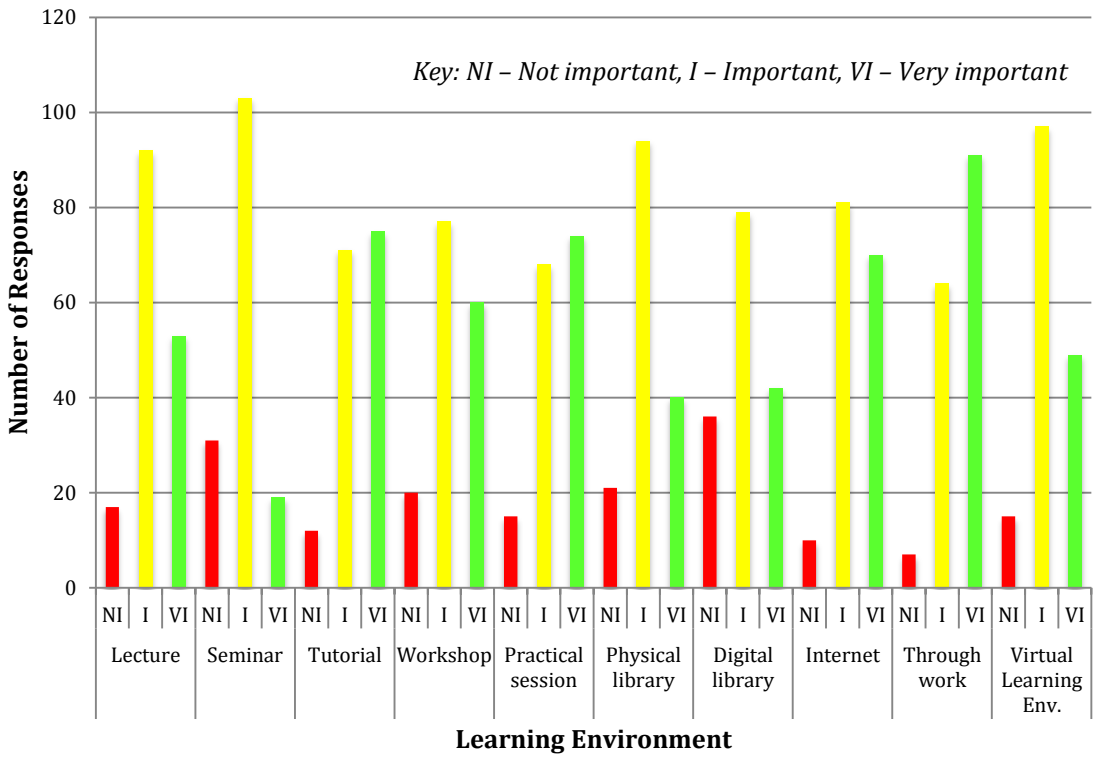


Figure 7.5: Preferred learning environment (all students)

The highest preferred learning environment identified by the students as being very important (VI) to them was learning through work. On the surface, this is not wholly surprising as 72% of students are part-time. When broken down to

full and part-time modes of study, as shown in Figures 7.6 and 7.7, a comparison between the two groups can be made.

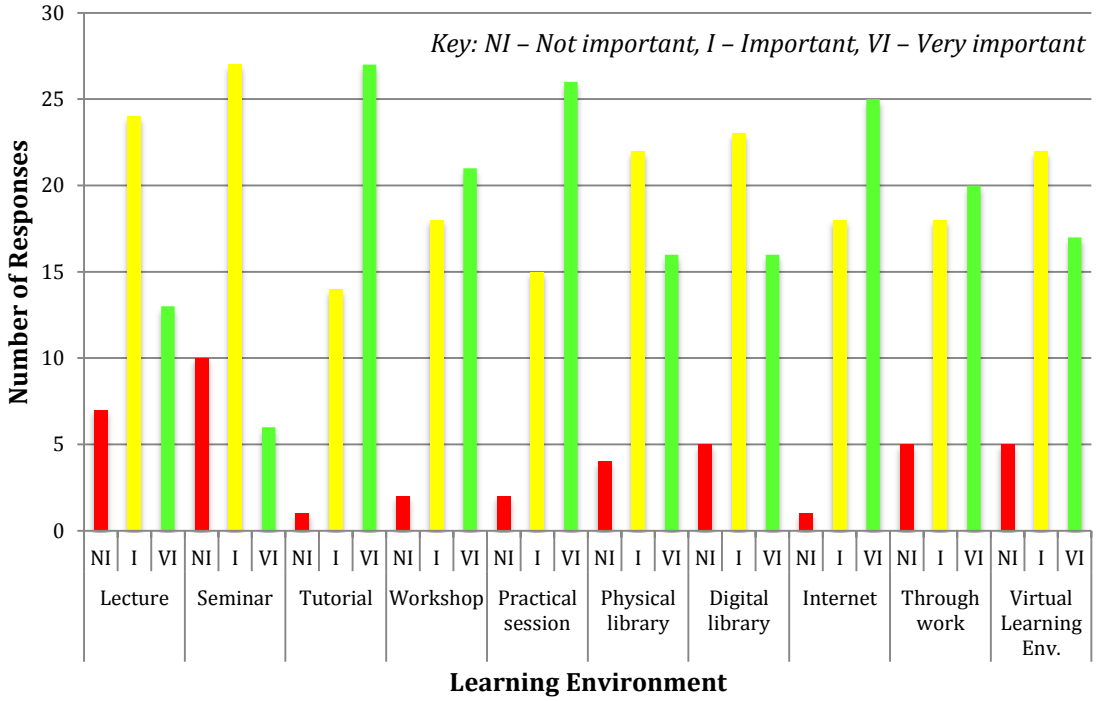


Figure 7.6: Preferred learning environment (full-time students)

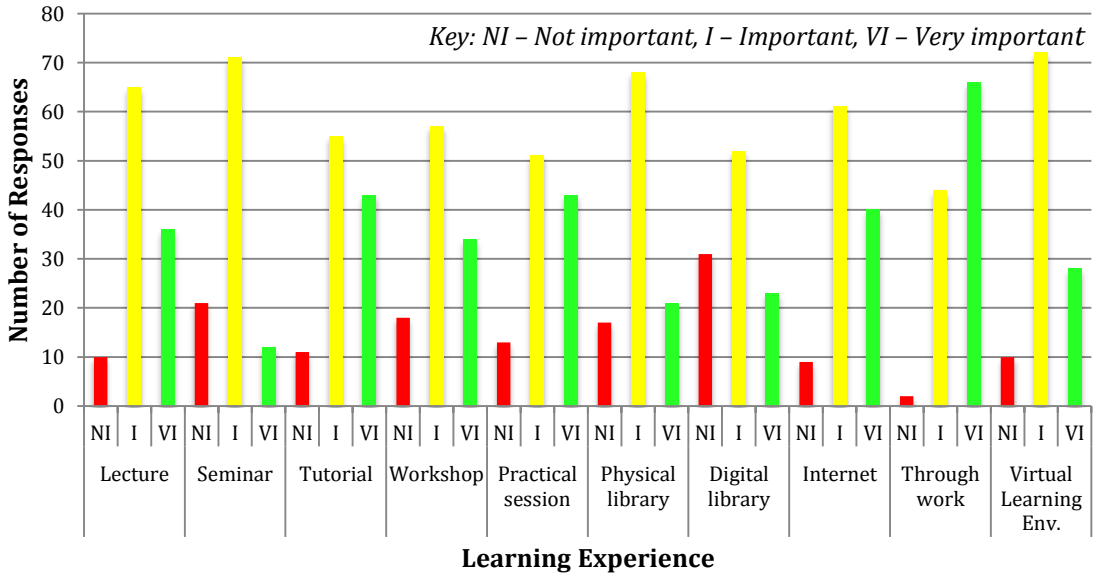


Figure 7.7: Preferred learning environment (part-time students)

The top learning environments identified by full-time students with the largest differentiation between that learning environment being very important (VI) and not being important (NI) is tutorials and for part-time students it is learning through work. The highest preferred learning environment identified by full-time students as being very important (VI) to them was tutorials and for part-time students it was learning through work. Table 7.3 provides a summary of the results.

Table 7.3: Summary of preferred learning environments

	All students	FT students	PT students
Top three learning environments identified by students with the largest differentiation between that learning environment being very important (VI) and not being important (NI)	Learning through work (80 difference – 51%), tutorials (63 difference – 40%) and the internet (60 difference – 38%).	Tutorials (26 difference – 59%), practical sessions (24 difference – 55%) and the internet (24 difference – 55%).	Learning through work (64 difference – 56%), tutorials (32 difference – 28%) and the internet (31 difference – 27%).
Highest preferred learning environment identified by the students as being very important to them (VI)	Learning through work (91 – 58%)	Tutorials (27 – 55%)	Learning through work (66 – 58%)

It is apparent from the information presented in Figures 7.5, 7.6 and 7.7 together with the summary in Table 7.3, that the influence of part-time students skews the results slightly. 58% of part-time students indicate that their preferred learning environment (very important) is learning through work yet only 44% of full-time students feel the same. It would be useful to take the analysis further and find out whether any of the full-time students had worked

either before or during their course and to see what effect this has on their responses to the preferred learning environment.

The preferred learning environment for each course group is also established. Figure 7.8 presents the results of the top four preferred learning environments.

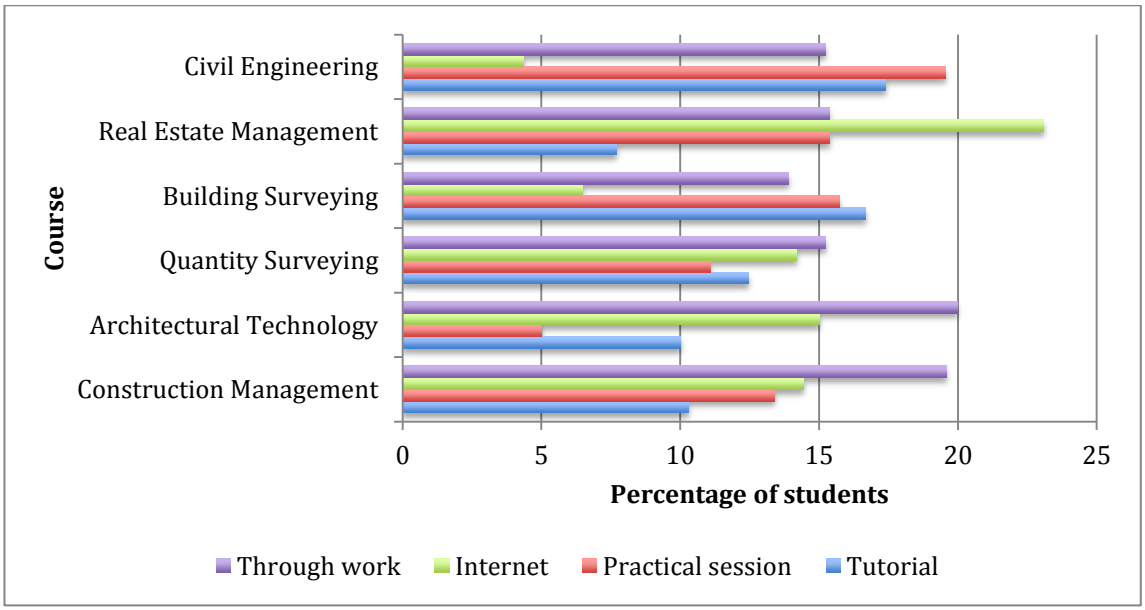


Figure 7.8: Preferred learning environment (courses)

Learning through work is preferred by three courses (architectural technology, construction management and quantity surveying). The highest preference (23%) is real estate management students who have a preferred learning environment of the Internet.

The third question focuses on whether the tutor outlined, structured and provided a summary to the lecture (Table 7.4). 40% (66 out of 165) of students indicate that all three themes occur during lecturers. The highest response came from construction management students with 53% (19 out of 36), closely followed by building surveying students with 52% (13 out of 25).

Table 7.4: Actions of the tutor during formal sessions

Tutor actions	Yes (%)	No (%)	Sometimes (%)
Outline the lecture	73	1	28
Structure the lecture	78	4	18
Provide a summary	53	6	41

Question 4 wanted to know how often students were encouraged to reflect on previous learning. Table 7.5 indicates that the highest course for reflection is building surveying where 60% (15 out of 25) indicate that they are either often or always encouraged to reflect on previous learning.

Table 7.5: Number and percentage of students who indicated that they are always/often encouraged to reflect on previous learning

Course	Always/Often	%
Architectural Technology	1	25
Civil Engineering	5	38
Construction Management	10	28
Building Surveying	15	60
Quantity Surveying	40	48
Real Estate Management	1	25

This is interesting as question 10 also focuses on reflection. For 'reflection-in-action', 61% of students sampled indicate that they are encouraged to reflect on an activity as it is happening and for 'reflection-on-action', 82% of students review an activity after it has happened. Only 3% of students never reflect on previous learning.

The fifth question focuses on five definitions of learning from three writers on the subject. Students are asked to tick the three that are most relevant to them. Table 7.6 provides a summary of the results with the preferred definition being

provided by Cobb (2010). The view of students indicate that learning does not stop and if this definition is read with the second highest definition, that by Pritchard (2008), then it could be deduced that experience plays a significant part in the learning process.

Table 7.6: Students' preferred definition of learning

Code	Definitions of learning	Number of student responses
L1	A change in behaviour as a result of experience or practice (Pritchard, 2008)	85
L2	A process, by which behaviour is changed, shaped or controlled (Pritchard, 2008)	42
L3	The individual process of constructing understanding based on experience from a wide range of sources (Pritchard, 2008)	129
L4	Learning is the lifelong process of transforming information and experience into knowledge, skills, behaviours and attitudes (Cobb, 2010)	139
L5	Learning is both a cognitive and a behavioural process (Raelin, 2008)	67

The hypothesis below is drawn for validation with the results presented in Appendix 7.3.

$H_{3\text{-main}}$:

There is a statistically significant relationship between those students who opted for the definition of learning L3 as well as L4.

Both Spearman's rho and Kendall's-Tau[b] test of concordance are closely related and the results provide the following conclusions:

1. L1 and L4 have a weak positive relationship (rho = 0.213; ρ<0.01), which suggests that those students who chose L1 were also likely to choose L4 and vice versa. The results indicate that 78 students (47%) selected both L1 and L4 while 19 students (12%) chose none of the two.
2. L1 and L5 have a weak inverse (negative) relationship (rho = -0.260; ρ<0.01), which suggests that those students who chose L1 were less likely to choose L5 and the vice versa. The results demonstrate that 61 students (37%) selected L1 but not L5 while 43 students (26%) chose L5 but not L1.
3. There are no statistically significant relationships among the remaining learning definitions, which indicate that those students who opted for the definition of learning L3 were not influenced to opt for L4 as well.

The results of question 6 support those in question 5, where 87% (144 out of 166) of students agree that a change of behaviour results from experience. The view of Klein (2009) identified in Chapter 3 where he states that learning is 'a relatively permanent change in behaviour that results from experience' (Klein, 2009, p.2) also supports the findings of the questionnaire. In question 7, however only 36% (60 out of 166) of students feel that instinct rather than experience determines behaviour.

Students are asked to provide a qualitative response to question 8 (63% response) and give their own definition of learning. Ideas/themes are grouped together in order to analyse these responses. Using the work of Piaget (1964), Atkinson et al. (1993), Burns (1995), Bailey, Hughes and Moore (2004), Brown (2004), Pritchard (2008), Raelin (2008), Atherton (2009), Moon (2009) and Cobb (2010), the student responses are coded into ten areas with the results presented in Table 7.7.

Table 7.7: Categories of student definitions of learning

Response category	Number of responses
Learning is about finding out something new	7
Learning is about gaining/broadening knowledge	23
Learning is about gaining knowledge from experience	19
Learning is understanding how something works	9
Learning is developing new skills	9
Learning is changing one's behaviour	2
Learning is about applying one's knowledge/information	10
Learning is about doing something you could not do before	1
Other valid response	18
Invalid response	6

The category with the most responses defines learning as being 'about gaining/broadening knowledge' with the second highest category of responses identifying that learning is 'about gaining knowledge from experience'. These definitions support the work of Pritchard (2008). The responses are also categorized into cognitive and behavioural areas as identified by Raelin (2008). The vast majority of students (85%) see learning as a cognitive process.

Question 9 focuses on the work of Bruner (1960) and the four key themes of: importance of structure and sequencing of material, readiness for learning, intuitive and analytical thinking and motives for learning, which he identifies as being central to the act of learning. Students are asked to identify, on a Likert scale, how important they are to their learning. Table 7.8 presents the results for each of the four themes, with the most popular (modal response) being highlighted in yellow. Students indicate that each theme is key to their learning with the 'importance of structure and sequencing of material' providing the highest number of single responses (91).

Table 7.8: Importance of learning themes to students' learning

Theme	Importance	Number of Responses
Importance of structure and sequencing of material	Not key	2
		3
		35
		91
	Very key	24
Readiness for learning (the curriculum should revisit topics on a regular basis)	Not key	0
		12
		58
		65
	Very key	19
Intuitive and analytical thinking (being given the opportunity to answer a problem without fear of ridicule)	Not key	3
		7
		37
		69
	Very key	39
Motives for learning (arousal of interest to engage students)	Not key	0
		9
		26
		72
	Very key	47

The results of question 9 can be compared with those in question 3, which asked the students to indicate which tutors during formal sessions, such as lectures, provide an effective outline, structure and summary to those lectures. It is pleasing to note that 73% of lecturers outline the lecture, 78% provide a structure to the lecture, however only 53% of lecturers provide a summary. The proposed integrated model of PDP and WBL provides a structured approach to the development of employability skills and competencies needed for professional membership. Bruner (1960) identifies the importance structure and sequencing of material has on a student's learning. It therefore seems important that lecturers provide structure to all the students' learning experiences.

The results of question 11 show that the vast majority of students (75%) indicate that professional practice is often or always emphasised during their

course (Figure 7.9). A professional body accredits all of the courses surveyed and 72% of students questioned are part-time so this may have an influence on the results. When the results of question 11 are analysed for full and part-time students 82% of full-time and 72% of part-time students indicate that professional practice is often or always emphasised during their course.

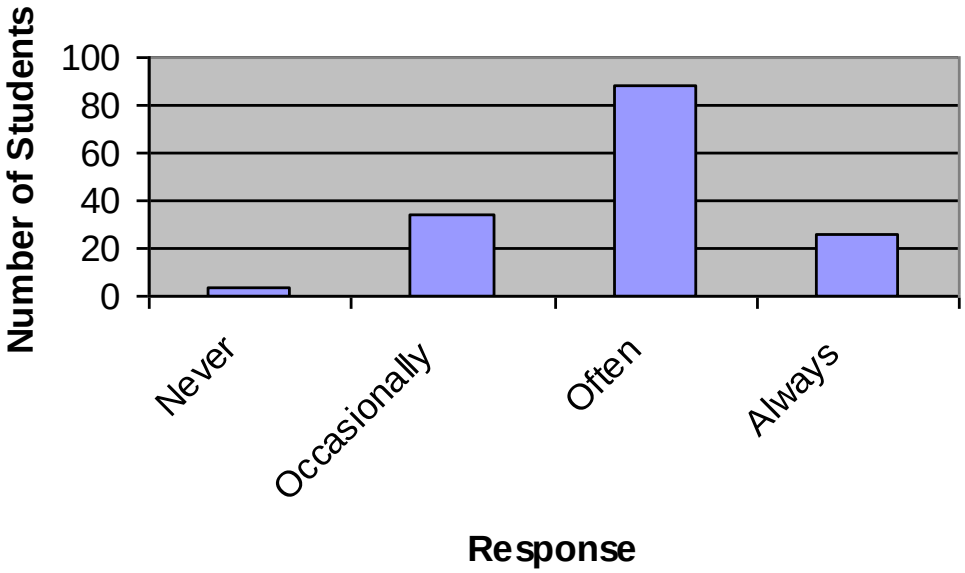


Figure 7.9: The extent to which professional practice is emphasised on the students' course

One significant factor, which influences student perceptions of their course, is the interaction with academic staff. Behaviourists believe that an external stimulus causes learning to take place, which results in a change of behaviour. In fact, Schön's (1983) work on the development of the concepts of 'reflection-in-action' and 'reflection-on-action' emphasise the importance of professional learning and development. Currently, 71% of staff in the Department of Engineering and the Built Environment at Anglia Ruskin University has at least one professional qualification related to professional practice in the built environment. This should play a part in informing students about the importance of becoming a professional.

Question 12 asks the students to rate a series of statements (compiled from the literature) on why learning is important to them. Of the ten statements, three

are specifically related to professional practice/careers (statements 1, 2 and 9). The three highest responses (mean average) from the students all relate to these three areas as shown in Table 7.9. The mode and median average results also indicate a very similar outcome.

Table 7.9: Why students want to learn

Statement	Mean	Mode	Median
1. To get a good job	4.41	5	5
2. The skills and knowledge will be useful for my chosen career	4.46	5	5
3. To study the subject in depth	3.44	4	4
4. University was the obvious progression from my previous study	3.17	4	3
5. Learning will help me develop as a person	3.58	4	4
6. Learning will broaden my horizons	3.76	4	4
7. It will give me a chance to prove what I can do	3.56	4	4
8. Study will improve my confidence and independence	3.48	4	4
9. To become a professional	4.31	5	4
10. To make a contribution to society	2.89	3	3

Evidence from question 13 suggests that the three types of knowledge: propositional, personal and process, identified by Eraut (1994) are adequately developed on the students' course (Figure 7.10) with the greatest difference in student responses between full and part-time students (Table 7.10) occurring in process knowledge (15 percentage points).

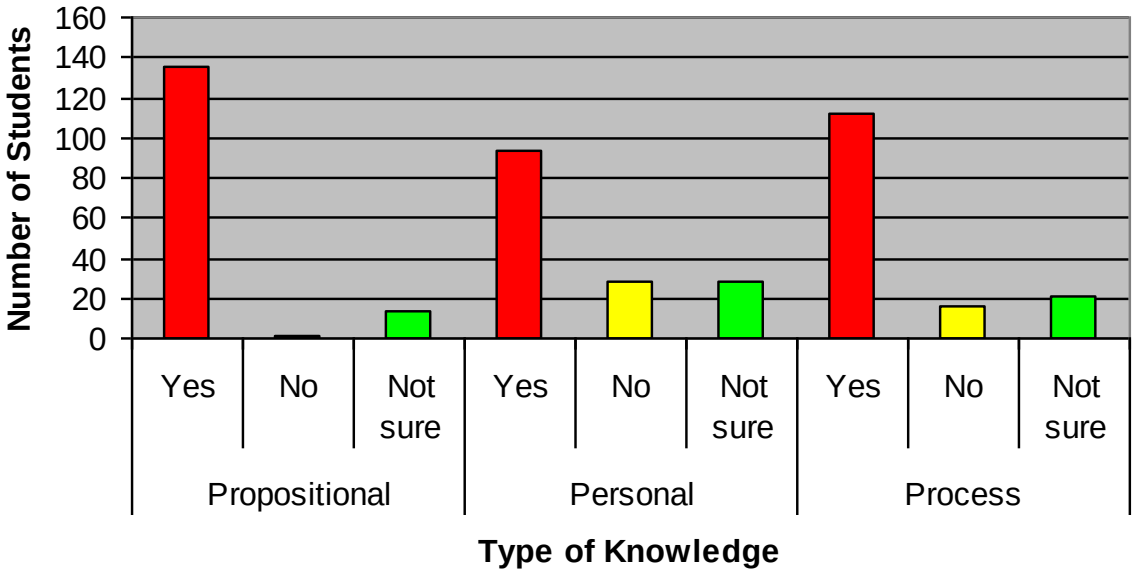


Figure 7.10: Identification of the development of the three types of knowledge identified by Eraut (1994)

Table 7.10: Percentage of students who feel the three types of knowledge are adequately developed on their course

Type of knowledge	FT (%)	PT (%)	Difference between FT and PT student responses
Propositional	84	84	0
Personal	48	62	14
Process	59	74	15

The majority of students (56%) can relate knowledge from one module to another module (Figure 7.11), however only 42% of students feel that theoretical knowledge is applied either well or very well to practical situations (Figure 7.12). This is a significantly lower figure than that given in question 13 (Figure 7.10) for process knowledge which links theory and practice together, where 71% of students feel that process knowledge is being adequately developed in their studies.

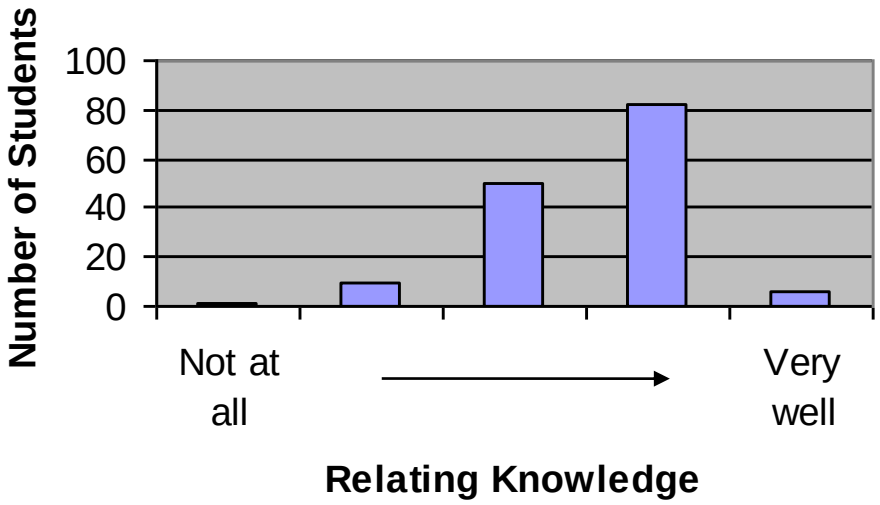


Figure 7.11: How well students relate knowledge from one subject to another

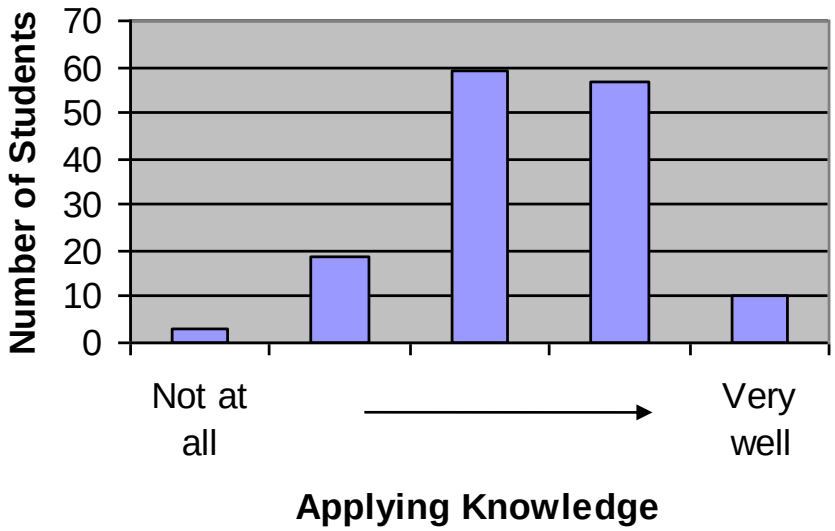


Figure 7.12: How well students relate the application of theoretical knowledge on their course to practical situations

To try and make sense of the abnormality of these results the analysis considers the difference between full and part-time student responses. 59% of full-time students and 74% of part-time students feel that process knowledge is adequately developed in their studies whereas only 41% of full-time and 42% of

part-time students feel that theoretical knowledge is applied either well or very well to practical situations. The evidence from question 15 suggests neither full-time nor part-time students can fully relate theoretical mode 1 knowledge at university to tacit mode 2 knowledge in the workplace. Full-time students struggle with this important concept and as such a period of WBL (development of tacit knowledge) could benefit this group of students. For part-time students the low figure of 42% who feel their course enables them to apply theoretical knowledge to practical situations is disappointing and does not support the evidence from question 13, where 74% of part-time students feel that process knowledge is adequately developed on their course.

7.2.2 Summary of responses to the student questionnaire

The questionnaire provides data, which enables comment to be made against the following research objective:

- *Identify what is included in the process of learning and how students might apply knowledge in both an academic and workplace setting.*

A 53% response rate across six courses including full and part-time students is achieved with the questionnaire. Both groups of students identify learning by doing as the preferred way of learning, with full-time students identifying 'tutorials' as their preferred learning environment and part-time students identifying 'learning through work' as their preferred learning environment.

The vast majority of students (82%) reflect on an activity after it has happened and this plays an important part in the learning process. The preferred definition of learning is 'about gaining/broadening of knowledge' with 85% of students seeing learning as a cognitive process.

Professional practice is emphasised on the student's course (82% full-time, 72% part-time) and students see interaction with academic staff as being

influential in their studies. The role of the lecturer and the way they deliver their module influences students' learning.

Students indicate that experience plays a significant part in the learning process with a change of behaviour resulting from that experience, however the results from the questionnaire indicate that neither full nor part-time students can fully relate mode 1 knowledge to tacit mode 2 knowledge in the workplace. Evidence suggests that full-time students could benefit from WBL being part of their undergraduate degree.

7.3 Interviews with experienced professionals working at the cutting edge of the construction industry on PDP and WBL

7.3.1 Results of the preliminary study

Five preliminary interviews are carried out with higher-level personnel using the methodology defined in Chapter 6. The preliminary interviews provide an important opportunity to assess interviewees' responses and refine the research design. Of the thirty preliminary interview questions, twenty-nine have been repeated in the subsequent study, however some questions have been combined and others have changed sections, whilst additional questions have been added. The results from the preliminary study are briefly presented in four sections with a selected example given in the appendices.

Section A – Information about the company and the individual respondent

Appendix 7.4 provides an overview of the five companies and higher-level personnel involved in the preliminary study with supporting evidence indicating that the person being interviewed is working at a higher-level personnel capacity. All five respondents are undertaking the higher-level personnel role

but have a different set of qualifications and varying levels of professional experience from
10 – 34 years. This suggests that academic qualifications are important but not having a minimum level of award such as an honours degree is no barrier to becoming a professional.

All six questions in this section are answered easily however there is some overlap between the answers depending on the level of detail given in the responses. As this section is background information the researcher did not feel having any overlap was a problem.

Section B – Importance of academic study and professional training

The first part of this section focuses on the importance of academic study and academic/professional qualifications. All five of the respondents feel that academic study is important and is a *'differentiator'* (COM C/EI/Act-Dif) when employing new staff. They also feel that achieving an academic qualification is very important and *'a degree is not a rare thing any more'* (COM C/EI/Edu-Ase). *'There should be a clear barrier to entry'* (COM A/EI/Edu-Bte). With regard to professional qualifications, four of the five respondents feel that professional qualifications are vital and *'if you've got the academic background and the expertise then a professional qualification is achievable by everyone if you make the effort'* (COM C/EI/Edu-Ase). Again, four of the five respondents feel that current academic qualifications generally meet the needs of becoming a professional. This view is emphasised by the following statement *'I think we can always criticise people coming out of university not having what we want as an employer but they go a long way towards giving us that …'* (COM A/EI/Wor-Wor).

The second part of Section B focuses on the content of a construction management degree. A summary of the respondent's thoughts is given in Appendix 7.5. There is a clear theme emerging from higher-level personnel with regard to the skills and knowledge sets that are important in the field of construction management. This theme is best summed up with the following

statements: *'People management skills, technical skills'* (COM C/EI/Wor-Pms) and '*There are obviously technical skills about what surveying is about but for this business that's equally as important as it is around relationships, about their personal skills in dealing with people' (COM D/EI/Edu-Tec)*. The construction industry is a people orientated industry and as such being able to work with and manage these individuals and teams of personnel can be challenging. Add to this the complex and changing nature of new construction materials and products then the two themes mentioned are highly prominent in many higher-level personnel lists. Indeed, the two key areas identified by Edwards (2009) as part of his research on foundation degrees as being important, are construction technology and applied management principles. Within the civil engineering field, mathematics and physics are a high priority '*I think maths and physics are a must for construction or civil engineering'* (COM E/EI/Edu-Bas).

The respondents see employability skills as being important (modal average 4 out of 5) but give a lower level of importance to PDP (modal average 3 out of 5). Unfortunately, the interviews did not ask the respondents to elaborate on their comments and this may be an area that can be explored further in the subsequent study.

WBL is seen by all the respondents as being highly valued and all agree that some form of WBL should be part of an academic course, so that the students can *'gain some experience on the job'* (COM A/EI/Wor-Wor) and '*it is tremendously important that people get out there – there's so much to learn'* (COM E/EI/Aje-Wbl).

The eight questions in this section are answered with detailed responses but the interviewer felt that the question '*On a scale of 1 – 5 (1 not important, 5 extremely important), should students studying an academic qualification such as an honours degree in construction management cover employability skills and PDP*?' needs a rationale to be provided with the ratings given.

Section C – Competence, capability and professional status

Several definitions are given in Chapter 2 for the words 'competence' or 'competent' with the general theme being provided by the literature covering the phrases of ability, application of knowledge and skill, and knowing how to perform and actually performing (Eraut, 1994; Kirschner and Van Vilsteren, 1997; Govaerts, 2008; Trinder, 2008). Three noteworthy examples are highlighted below:

- *'For me I immediately think of the ability of the person to deliver'* (COM A/EI/Per-Abi).
- *'Competence therefore has to be an adequate knowledge of a product or a process that they are doing and the environment they are doing it in. It doesn't guarantee success on every occasion but it means that person has enough experience and knowledge of what they're doing'* (COM C/EI/Per-Cop).
- '*Someone that can without recourse to other people can personally solve a problem satisfactorily'* (COM E/EI/Per-Pes).

The higher-level personnel interviewed consistently mention that experience plays a key part in becoming a professional. *'I think they are absolutely vital. Because people learn from physical experiences and it rests in their memory for longer and it has a bigger impact.' (*COM C/EI/Wor-Exp). Dreyfus and Dreyfus (1980) share this view and indicate how important concrete experiences are in generating high levels of performance.

All eight questions in this section are answered with detailed responses where required. In the subsequent study six additional questions are added which mainly focus on two competence models (Miller, 1990 and Cheetham and Chivers, 1998) and the list of enhanced employability skills and competencies.

Section D – PDP, professional skill development and WBL

The final set of questions considers the importance of 'employability skills' and the relevance of PDP and WBL. Respondents' views cover the employer's expectation of how employees should conduct themselves at work. It is not surprising that phrases such as '*ready to work'* (COM A/EI/Act-Wil), '*part of a team'* (COM B/EI/App-App) and '*present themselves professionally' (COM C/EI/Per-Cbh)* are mentioned. One respondent commented '*I think one of the biggest things is being able to communicate with people and that's especially important on building sites'* (COM E/EI/Act-Rep). Employees represent the company they work for; they market the company by their behaviour, actions and how they look. Teaching employability skills as stand-alone subjects is not the way forward but embedding these important skills in a university curriculum around professionalism and ethics would go someway to bridging the gap that appears to have developed between what employers want and what employers sometimes get.

There is an overwhelmingly positive response to academic study linking more closely with the workplace and for an academic award to have an element of WBL. This view comes across in both Section B and Section D of the interview questions. It is interesting that not all respondents agree that all workplaces are a suitable environment for learning. The comment '*I think you can learn something from every environment but obviously some are better than others'* (COM A/EI/Aie-Wbl) provides a more balanced view and it suggests that developing a work ethic is a useful skill to have.

The six questions in this section provide answers, which overlap with the questions in Section B. The researcher decided to combine Sections B and D for the subsequent study interviews. The question *'Employability is considered by some in higher education to be the buzzword. What employability skills need to be taught as part of an undergraduate degree?*' was removed from subsequent study interviews as it overlapped with the list handed out on the enhanced employability skills and competencies.

7.3.2 Summary of the preliminary study

The results of the preliminary interviews highlight overlap between the four areas of questioning and a slightly revised set of questions are produced. All respondents are in a higher-level position and they all see themselves as professionals, all be it for different reasons, but have different educational qualifications and varying levels of professional experience.

The interviews provide data, which enable comment to be made against the following research objectives:

- *Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.*

Each of the higher-level personnel questioned feel that academic study is important and having both an academic and professional qualification is in four out of five cases vital. They also feel that current academic qualifications generally meet the needs of becoming a professional. There is no consensus of opinion from respondents regarding their preference for formal/informal training however it is stated that both academia and industry should work together.

- *Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work.*

The views from respondents demonstrate very clearly that academic study should link more closely with the workplace and an academic award should have a work-based element. Higher-level personnel add that not all workplaces are suitable environments for learning and assessing in the workplace might be difficult.

- *Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.*

The higher-level personnel questioned see PDP as a useful part of an academic course but only when linked to the workplace. The respondents see employability skills as being more important than PDP and focus on an employer's expectation of how employees should conduct themselves at work. These skills should not be taught in isolation but embedded in the curriculum.

Professional skill development is seen as an important part of becoming competent. Respondents feel that *'people management skills, technical skills'* are important in the field of construction management and a competent person should have a broad spectrum of knowledge to be able to perform across a range of tasks.

The preliminary study with higher-level personnel provides reassurance that the research method chosen of a structured interview is appropriate and gives confidence that sufficient quality data will result in a meaningful and detailed analysis. Following the preliminary interviews, only minor changes and additions are made to the questions. This suggests that the format used is appropriate. Higher-level personnel are happy to give up their time as they feel the topics covered during the interviews are relevant to their work and they can contribute in a knowledgeable way. The higher-level personnel are professional and show a genuine interest in construction education and the research topic.

7.3.3 Results of the subsequent study

The data from the subsequent study interview questions provide further in-depth responses, which enable a deeper analysis of respondents' views on research objectives 2, 3 and 4 identified in Section 1.5. A further eight interviews are carried out with higher-level personnel, again using the

methodology defined in Chapter 6. The results from the interviews are presented in three sections. Data from the preliminary interviews is included where this is seen as adding value to the discussion.

Section A – Background information

Appendix 7.6 provides an overview of the eight companies and higher-level personnel involved in the subsequent study with detailed supporting evidence, which indicates that the person being interviewed is working at a higher-level capacity.

Of the eight respondents carrying out a higher personnel role, five are professionally qualified and all of these achieved their professional qualification with an appropriate level of academic study, but not all with a degree. This suggests that academic qualifications are important but not having an honours degree is not a barrier to becoming a professional. A summary of the respondents' thoughts on how they achieved their higher-level position in the company and what they believe to be the work of a professional is given in Appendix 7.7.

Two responses are worthy of note as to why the higher-level personnel see themselves as a professional. Company F respondent sees the level of ones own professional qualifications as a mark of being a professional, *'obviously MCIOB'* (COM F/EI/Wor-Rmd) whereas the Company B respondent sees being a professional as the outcome of ones *'actions in managing the operations of the business'* (COM B/EI/Wor-Pre). These cover significantly different things as outlined in Chapter 2 by the Institute for Learning (2009).

The responses (Appendix 7.7) on the work of a professional in the construction industry cover two distinct themes: function and conduct. A professional is seen as an expert, with the technical knowledge to act in an advisory capacity. They carry out this role in a way that demonstrates ethical responsibility and are seen as role models in society. This supports the view of Mayer (2002) in that a professional's work development and application of knowledge through their

expertise, follows an ethical code of conduct. Based on the Occupational-Professional Model identified by Pavalko (1971), higher-level personnel do see themselves as belonging to a profession rather than following an occupation. Their extensive knowledge and professional expertise can be transferred to a variety of situations requiring higher-level skills and competencies.

Section B – Importance of academic study, PDP, professional skill development and WBL

The first three questions in this section are the same as the preliminary study and focus on the importance of academic study and academic/professional qualifications. The respondents see academic study as being important but the level of importance is on a continuum from *'it is important to everyone'* (COM G/EI/Edu-Ler) to '*I think a certain level of academic study is important'* (COM E/EI/Edu-Ase). The over-riding theme from respondents is that it is a *'base from which to develop'* (COM H/EI/Edu-Bas*)* and 'a*t university you learn the theoretical knowledge to carry out practical work'* (COM L/EI/Edu-Ler).

The majority of respondents feel that the professional should have an academic qualification (62%) and a professional qualification (54%) in order to practice, with 23% of respondents having no positive or negative view. There is overwhelming support (77%) for current academic qualifications meeting the needs of becoming a professional, however Company H provides a very good caveat to becoming complacent '*I think it's an ever evolving answer, yes, they do, but they mustn't stand still'* (COM H/EI/Edu-Rel).

The first two stages of Miller's framework for clinical assessment focus on the gaining of knowledge and how that knowledge can be applied in a workplace setting. Evidence from the structured interviews suggests that the gaining of knowledge is an important part of becoming a professional and universities play a key role, especially in a rapidly changing world. This supports the view made by Eraut (1994, p.14), which is outlined in Chapter 2, and his statement that higher education can help accelerate 'the growth of the professional knowledge base.' Indeed the work of Fraser and Greenhalgh (2001) support an education

process to enhance capability provided it includes feedback about performance. This final point is extremely topical as it is one of the six key areas of the National Student Survey (NSS).

The next part of Section B focuses on respondents providing a definition of the term 'PDP'. A selected example is given in Table 7.11.

Table 7.11: Response from higher-level personnel to the definition of PDP

Question	How would you define the term PDP?
Response	*Personal means about yourself, although you're not necessarily doing it. Development is a fairly broad thing in that it's self-improvement either for immediate benefit or for a long-term benefit. And planning implies forethought so in my particular case the most effective PDP has come when it's planned in conjunction between employer and employee and it does involve some gap analysis and it does turn into a plan that's realistic.* (COM C/EI/Act-Imp)

The example introduces three further terms: self, development and forethought. These fit neatly with the definition provided by the QAA (2009, p.4), who define PDP as a 'structured and supported process undertaken by a learner to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development.' Chapter 5 indicates that PDP is related to both academic study and the world of work. It is therefore vital that PDP is not seen as either an educational requirement or a workplace requirement but a holistic process that links both university and the world of work together.

As with the preliminary study, the respondents saw employability skills as being important (modal average 5 out of 5). Indeed, the author's own institution places a high priority on their Employability Strategy making reference to it in the university's Corporate Plan 2012 – 2014. Nationally, employability of graduates has taken a far greater priority through the publication of Key Information Sets (KIS data) on each course which are available via the Unistats

website (the official website for comparing UK higher education course data). With reference to the employability of graduates, the website has key information regarding:

- average salary six months after finishing the course,
- percentage of students who go into work and/or study, and
- employability rates six months after the course has finished.

The honours degree in Construction Management at Anglia Ruskin University currently shows (2013) an average starting salary of £20,000, slightly below the national average, with 85% of students going onto work or further study within six months after finishing their course. Indeed, one of the course's former students provided the following comment 'My course prepared me for employment, and was very focused on the needs of employers' (ARU, 2012c).

As with the preliminary study, higher-level personnel see PDP as not being as important (modal average 4 out of 5) as employability skills. The rationale for this centres around there being no substitute for experience especially for those students on a full-time course whereas PDP can be developed both in the academic institution or the workplace '*I don't think that PDP is as important, I think that is something that can be got round but I don't think the first one can' (COM H/EI/Wor-Exp).*

The next set of questions in this section focus on the suitability of the workplace and how WBL can be part of an academic award. As with the preliminary study, higher-level personnel feel that academic study should link more closely with the workplace and for an academic award to have an element of WBL. WBL is seen by all the respondents as being extremely important and they all agree that some form of WBL should be part of an academic course, so that the students can '*come away with a better appreciation of why they're being educated with the information they are, how they apply it'* (COM H/EI/Aie-Ttp). There is disagreement on whether all workplaces are a suitable environment for learning. 67% agree they are but the other 33% feel that '*that some workplaces*

would be very difficult for a student to gain very much experience' (COM I/EI/Wor-Exp).

As Miller (1990) highlights, the second stage of achieving professional competence is having the 'ability to apply that knowledge'. Within the Department of Engineering and the Built Environment, at Anglia Ruskin University, the underpinning aim of WBL is to use the academic skills that are developed during attendance at university to support the professional practice that occurs in the workplace. Unfortunately, WBL does not occur on each course and its implementation is sporadic. The views from higher-level personnel would suggest that *'courses should have a work-based element. It provides the reality of the conversion of theory into practice'* (COM B/EI/Aje-Ttp).

The final part of Section B focuses on the type and application of professional training. Selected examples are given in Table 7.12.

Table 7.12: Responses to the type and application of professional training

Question	Type of professional training preferred – informal/formal	How can this training be applied in the workplace?
Response	*Well we do a combination of both here. A lot of it is formal and a lot of it is informal with seminars in the boardroom here for example. It's dependant on what we're doing. A combination really. (COM J/EI/Edu-Ler)*	*I think what you would need is a champion in the workplace that's got a good understanding of points being introduced and the academic processes of that and I think it would be down to them to police and mentor and be the champion of that individual for that company.* (COM F/EI/Aie-Was)

There is no consensus of opinion from higher-level personnel regarding their preference for informal and formal training. An interesting point is made by one of the respondents, which is worthy of note. Company B states '*If we have an*

understanding of what the academic study is, we should facilitate that development' (COM B/EI/Aje-Wor). This clearly suggests that both academia and industry should work together. This very point is made in Chapter 2 by Jackson (1970, p.4, cited in Bilodeau, 2004, p.7) with the statement 'the relationship between universities and the professions goes back to the founding of the university as an institution of learning. Universities educate new professionals, conduct the research that extends the professions body of knowledge, and lends the profession a degree of legitimacy'.

A balanced approach involving both formal and informal learning is the way forward. Involving industry in a student's study whether they are full or part-time is a goal worth aiming for. How this can happen to benefit all parties is the million-dollar question.

Section C – Competence, capability and professional status

The subsequent study provides several definitions for the words 'competence' or 'competent'. The themes running through the definitions are very similar to those in the preliminary study with knowledge and the application of skills mentioned several times. The statements made are in agreement with the literature and they suggest that being competent is about being able to deliver. However, does competence refer to general or specific competencies and should a competent person be able to perform across a range of specific duties? Selected examples are presented in Table 7.13 on these competency questions.

Table 7.13: Responses to competency questions

Question	Do you think the term competence refers to a person's specific or general competence?	Should a competent person be able to perform across a range of specific duties rather than one thing and is it enough for professionals to only be competent in a limited range of competencies?
Response	*I think general. I think it's something that is in life it's not just the academic it's your whole perception, how you perceive life isn't it. If you are a highly professional person with integrity, honesty, you use that in your personal life and very much in your professional life.* (COM G/EI/Per-Cbh)	*All professionals should be able to cover many different duties. My role is varied at work. I will be dealing with site-based issues, client based issues and business related issues so if I'm only competent in one thing I wouldn't still be in the position I am at the moment.* (COM M/EI/Per-Cop)

Evidence from the interviews suggests that a person's competence refers to their general rather than specific competence and that they should be able to perform across a range tasks and have the broadest spectrum of knowledge as possible. Cheetham and Chivers (1998) in their revised model of professional competence indicate that knowledge (knowledge/cognitive competence) and performance (functional competence) are two of the four core components. Knowledge is both technical and tacit (knowing how and knowing why) and performance is both general (mental) and specific (occupation based). It appears that there is disagreement between the respondents' views and Cheetham and Chivers view on the value of performance across a range of general and specific duties, however it is likely this can be explained in the terminology used. According to one respondent *'If you look at a specific then I would refer to specialisms rather than competence'* (COM B/EI/Wor-Spe).

Competence is a measure of output, which links well with the use of competency profiles. According to Mumford et al. (2000, cited in Müller and Turner, 2010, p.437) 'Managers are more likely to perform better or to stay longer in their position if their personal characteristics meet the requirements of

the position.' Competency profiles are about identifying a person's knowledge, skill set and level of proficiency to enable successful performance to take place. There is broad agreement from respondents on the use of competency profiles with the following two comments giving support for their use:

- *'Absolutely. If you've got senior people who are purporting to be managers of teams but don't have the competencies that their own teams do I think there could be mutiny!!* (COM I/EI/Per-Cop)
- *'Yes, I think they should. For ourselves when we're recruiting higher up the ladder, we take out the professional personality profiling'* (COM K/EI/Wor-Pro).

There is a clear difference of opinion from respondents regarding NVQs. At one end of the continuum *'NVQs are filling a gap that previously existed' (*COM B/EI/Wor-Fag), yet at the other end there is a *'lack of credibility'* (COM C/EI/Act-Cre), with the qualification. The evidence suggests NVQs have a role to play in the workplace but needs to enhance its reputation especially related to knowledge evidence, *'I think sometimes the weakness there is that the individual needs a good underpinning knowledge to support going through that. Sometimes NVQ's are a bit short of that as opposed to degree routes, which are stronger in it.'* (COM F/EI/Edu-Bas). Company K makes an interesting point about NVQs in that they are not a qualification where you learn knowledge but '*it definitely makes you analyse and improve. You reflect on what you already know'* (COM K/EI/Act-Ref).

As part of the data collection and subsequent analysis, higher-level personnel are asked for their definition of the term 'capability' and what makes someone capable. Their responses can be compared with the model suggested by Stacy (1996) and Stephenson (1995, cited in Fraser and Greenhalgh, 2001) on competence and capability in complex adaptive systems. It is apparent from the model that the move from competent to capable does not occur instantly and is dependent on one's ability to cope with unfamiliar tasks in an unfamiliar environment. According to respondent Company B *'capability is about depth of*

competency' (COM B/EI/Edu-Dol), a view shared by the respondent from Company A *'there are various degrees (of competency)'* (COM A/EI/Per-Cop). Capability and performance are linked. The more capable an individual, the greater their performance level should be. Company H feels that capability is linked to confidence. '*The confidence-side can become an issue, nervousness can become an issue, but you've got to have somebody who is sharp enough to then blend that capability with a confidence and get you a good result'* (COM H/EI/Per-Con).

The higher-level personnel in both the preliminary and subsequent study interviews have consistently mentioned that experience plays a key part in becoming a professional. Company H feels that *'they help achieve higher-levels of performance'* (COM H/EI/Wor-Exp) and Company G feels that *'the wider your knowledge the better you are'* (COM G/EI/Per-Knw).

The next question, which relates to how a professional should act/behave, was added following the preliminary study. The mean, median and modal averages are given in Table 7.14.

Table 7.14: Responses to the questions on how a professional should act/behave

On a scale of 1 – 5 (1 not important, 5 extremely important), should a professional be:	Mean	Median	Mode
Competent	5.00	5.00	5.00
Act in an ethical way	4.88	5.00	5.00
Put the client first	3.25	3.50	4.00
Act in the best interest of society	4.25	4.00	4.00

The results indicate that 100% of respondents feel that a professional should be 'competent' and 'act in an ethical way'. This supports the inference implied in the work of Stebbins (1992) and Bilodeau (2004) on moving from an amateur to

a professional. There is less support for 'putting the client first' with Company H having the view that *'there needs to be a balance'* (COM H/EI/Edu-Pvm) and Company G indicating that '*you have to advise clients and there are many occasions we have had to take them to one side and tell them that this is not the right way forward'* (COM G/'EI/Wor-Rth). Finally respondents feel that a professional should 'act in the best interests of society', a view shared by professional bodies in the built environment sector with a Royal Charter.

Another question that appeared in the preliminary study, related to the respondents choosing their five preferred attributes they feel are important to the role of a professional. The results are presented graphically in Figure 7.13.

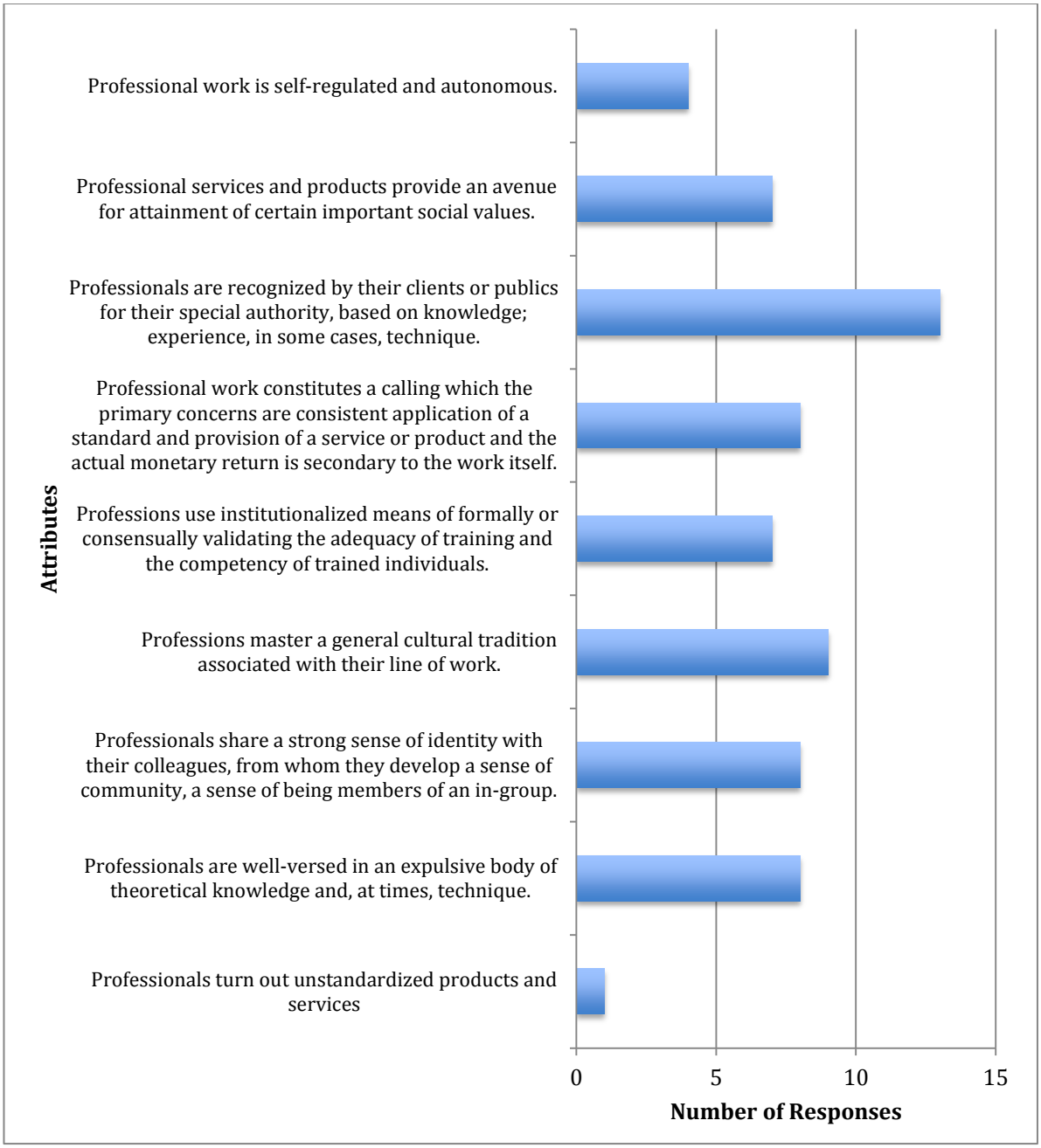


Figure 7.13: List of attributes important to the role of a professional

The respondents share the view of Stebbins (1992) with all of the attributes represented. Again, key words and phrases are used to describe the work of a professional and how they are recognised/perceived by society. The words 'knowledge, experience, competent, identity' provide key milestones in pursuit of an integrated model of PDP and WBL to enhance traditional academic theory.

Three further additional questions are asked to higher-level personnel in this final section. The first of these relate to Miller's framework for clinical assessment and whether the respondents agree with Miller's views and whether the model can be applied to construction management. 88% (7 out of 8) respondents agree that that the higher up the pyramid an individual goes; the greater is the individual's knowledge and their ability to apply that knowledge. There is no consensus of opinion between the eight respondents that the model provides a distinction between competence and performance (Figure 7.14).

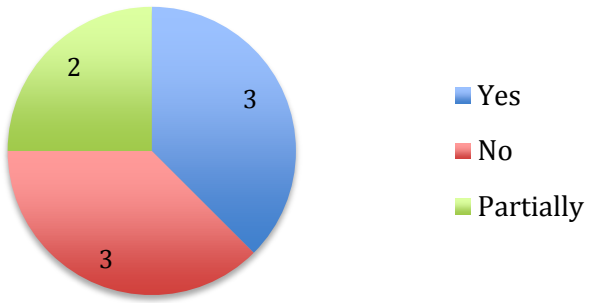


Figure 7.14: Respondents views on whether Miller's Pyramid provides a distinction between competence and performance

All except one respondent (88%) feel that the model could be applied to construction management. According to respondent Company K *'Yes, trainees learn knowledge at "know" and gain experience then "knows how". They then "show how" with supervision and eventually "does" performing as a site manager'* (COM K/EI/Act-App).

The second question relates to Cheetham and Chivers and their four core components of professional competence. On a scale of 1 – 5 (1 not important to 5 extremely important) respondents indicate the importance of each component with the results presented in Table 7.15.

Table 7.15: Responses to the importance of Cheetham and Chivers four core components of professional competence

Component/Sub-component	Mean average
Knowledge/Cognitive competence	**4.50**
Technical	4.63
Practical	4.63
Procedural	4.63
Contextual	4.50
Application	4.63
Functional competence	**4.63**
Occupation specific	4.38
Process/organization/management	4.63
Mental	4.38
Physical	3.50
Personal/Behavioural competence	**4.63**
Social/vocational	4.25
Inter-professional	4.63
Values/ethics competence	**4.38**
Personal	4.13
Professional	4.63

There is broad agreement that all of Cheetham and Chivers core components of professional competence are important. The respondents feel that being able to perform (functional competence) and the way the professional conducts themselves (personal/behavioural competence) are the most important. This view of performance being important is at the very heart of Miller's Pyramid where the top level 'does' implies competence. In the Dreyfus and Dreyfus model, mastery implies high and sustained levels of performance. Since high levels of performance are seen as being an important part of being a professional, it is relevant to ask higher-level personnel to comment on the list of 'Enhanced employability skills and competencies' (Table 4.4, Chapter 4 and included in Appendix 6.8 as part of the interview questions) and whether they agree with the list or whether anything was missing from the list. All higher-level personnel are in total agreement with the list of 'Enhanced employability skills

and competencies' presented to them, however they do feel that additional skills and competencies could be added, which are shown in Table 7.16 below.

Table 7.16: Additional employability skills and competencies to be added to Table 4.4, Chapter 4 following the higher-level personnel interviews

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
• Contract Law • Health and safety	• Data handling		• Assertiveness • Attention to detail • Creativity • Open-mindedness • Positive attitude • Professional

The information in Tables 4.4 and 7.16 can be compared with the information in Appendix 4.4 on the identification of knowledge and understanding, intellectual, practical and transferable skills, taken from undergraduate Built Environment Course Specification Forms (CSFs) at Anglia Ruskin University. The results for the BSc (Hons) Construction Management course are presented in Table 7.17. The words and phrases highlighted in yellow covering the revised enhanced employability skills and competencies are present (same words and phrases) on the BSc (Hons) Construction Management Course Specification Form (CSF) at Anglia Ruskin University. The words and phrases highlighted in green can be inferred to be present due to the work students' cover in the modules on their degree course. Students are working towards the practical application of the words and phrases highlighted in blue but there appears to be limited coverage of Personal Attitudes and Attributes (Expectations of a Professional)

on the BSc Construction Management course. All of the subject specific knowledge and study and employment skills are covered on the CSFs, with less coverage of the specific career competencies and limited coverage of the personal attitudes and attributes. The skill gap will be explored in the next section following the questionnaire to students.

Table 7.17: Comparison of knowledge and understanding, intellectual, practical and transferable skills from the BSc (Hons) Construction Management Course Specification Form (CSF) at Anglia Ruskin University to the revised enhanced 'super suite of employability skills and competencies' taken from the higher-level personnel interviews

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Study and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
• Built environment • Business management • Contracts (administration and law) • Construction related computer applications • Construction technology • Disputes • Financial management • Health and safety • Information management • Law • Leadership • Management • Monitoring and controlling • Planning and organising • Procurement • Strategic management • Surveying • Sustainability	• Analysis • Communication • Data handling • Decision making • Improving ones own performance • Inter-personal skills • IT literate • Judgements • Literacy skills • Numeracy skills • Problem solving • Questioning • Teamwork • Time management • Working with others	• Commitment to code of ethics • Commitment to CPD • Communication • Decision making • Developing people or teams • Implementing sustainable construction and development • Innovation • Knowledge of commercial, contractual and legal issues • Leadership and strategic/financial management • Managing information • Managing health and safety • Managing quality • Personal effectiveness at work • Planning and organising work • Professional judgement and responsibility	• Adaptability • Assertiveness • Attention to detail • Autonomy • Can do approach • Common-sense • Creative and imaginative thinking • Decisiveness • Forward thinking • Initiative • Integrity • Intuition • Open-mindedness • Positive attitude • Presentable • Professional • Reflectiveness • Respect • Responsibility • Self-motivation • Sensitivity • Visionary

The final question established respondents' views on how an undergraduate degree can enhance a student's capability. The view from higher-level personnel is very much about '*academics and the business world working together'* (COM B/EI/Aje-Wor) *and 'I think some exposure to the world of work earlier rather than later'* (COM I/EI/Wor-Exp). The evidence clearly suggests a structured approach where the knowledge gained in university is put into practice in the workplace and the knowledge gained in the workplace is revisited back in university. This reflective academic/workplace approach fits with the experiential learning cycle of Kolb (1984). By introducing a WBL element to full-time courses, there will be an opportunity to enhance a student's capability to happen sooner. A view supported by the following statement '*My gut reaction to that one would be that the sooner they get some work-based experience within that degree period the better'* (COM D/EI/Aie-Wbl).

7.3.4 Emerging ideas

It is important as part of the data analysing process to establish key themes in the data in order that critical comment can be made and justified. Section 6.8.2.1 identifies the process for deconstructing the interview responses (selected examples given in Appendices 7.5 and 7.7) and establishing and interrogating the relationships between them in order to determine emerging ideas. An initial sorting of the data reveals 167 emerging ideas (Appendix 7.8), which are reduced to 106 emerging ideas (Appendix 7.9) by identifying similar themes from the data and grouping the information together. Five thematic clusters (Appendix 7.10) evolve from the emerging ideas, which provide an overview of cluster content. The cluster headings are:

- Academic and industry engagement
- Actions
- Education
- Personal (development, enhancement, performance, self)
- Work

Academic and industry engagement

The emerging ideas generated in this cluster describe a before and after approach to the way academia and industry work together. The approaches used are '*diverse*', there is a '*lack of integration'* and not all workplace experience gained is seen as being '*appropriate*'. To ensure there is greater involvement by industry in university courses '*industry-based projects*' for full-time students can be used, where employers are involved in focused; yet challenging work-based activity. Students could spend part of their week in the workplace with the employer leading the project and the students identified as a problem solver. The challenge would be to use this experience as a piece of assessment and therefore attract credit.

'*Workplace assessment'* is seen as one of the emerging ideas from the structured interviews with a '*champion*' identified in the workplace to carry out the assessment. This raises questions as to their suitability and how this assessment can be managed, monitored and verified.

Higher-level personnel see '*theory into practice'* as being a key emerging idea and it was repeated several times in the interviews. Partnerships are seen as a way of academia and industry working together with a structured approach to '*WBL*' being important. This reinforces the message presented by Corkill (2006) that employers must have a say in the WBL experience with negotiated activity being a key component part of that process.

Actions

This thematic cluster grouped together emerging ideas about the student, employee, employer, and university putting in place something to achieve an aim or goal. This relates very well to the criteria used in the development of a model of PDP and WBL to enhance traditional academic theory. The learning environment influences students' performance with PDP activities playing a key role in the skill development of students. The resulting actions identified as one of the thematic clusters has the potential to enhance achievement of

professional competencies and professional capability.

Education

Higher-level personnel see academic study as being important to becoming a professional. A key emerging idea from the structured interviews is that students must have the '*basic academic skills'*, which include appropriate '*scientific knowledge'*. Higher-level personnel see the '*understanding of construction processes and technology*' and '*report writing'* as being important. The curriculum should be '*relevant*', there should be '*depth*' to the study and it should cover a '*range of spectrums'* with a '*balance between theory and practice'*. This fits well with the importance that is placed on the learning environment and that the learning must be relevant (related to professional practice) and that tutors need to demonstrate the application of knowledge to practical situations (Extract from Appendix 7.17).

Personal (development, enhancement, performance, self)

The emerging ideas in the cluster bring together the four areas of development, enhancement, performance and self. They are all related to the individual and how improvement can happen. Higher-level personnel indicate that '*attitude, communication, common sense, conduct/behaviour, initiative, and interpersonal relationships*' are key graduate skills and personal attitudes and attributes. Higher-level personnel identify that the learning never stops with '*CPD*' and '*professional training'* being highlighted as important. Students need to look ahead with '*confidence*' and need to become '*competent*' in both '*general and specific tasks'*. '*Practical (background, experience and knowledge)*' is seen as being key to ensuring '*career progression'*.

Work

Higher-level personnel see the professional as a '*role model'* and a '*specialist*' with '*expertise*' in a wide spectrum of activity. To become a professional, '*experience (concrete, physical, real, site)*' is seen as being an important factor.

Employees need to have '*exposure'* to different environments with '*job training'* being an emerging idea to develop staff. Having a '*mentor*' can enhance the process. Higher-level personnel see '*people management skills'* and '*health and safety'* as being crucial to developing the company's '*business needs'*.

The emerging ideas grouped within the five thematic clusters have demonstrated that pure academic theory alone will not enhance capability. Students need work experience, not only after graduation but also during their degree. There needs to be a learning environment that relates theory to practice and students need to be able to demonstrate that they have the graduate skills and personal attitudes and attributes for employment. Partnerships between academia and industry can ensure students see the relevance of their degree, they are prepared for work and they see the importance of becoming a professional in the construction industry.

7.3.5 Summary of the subsequent study

The subsequent study results reinforce those of the preliminary study with all respondents being in a higher-level position. When it came to the question about being a professional, one respondent did not like the terminology used but did acknowledge that they were thought of as professional. All the other higher-level personnel see themselves as professionals, albeit for different reasons, but have different educational qualifications and varying levels of professional experience.

The interviews provide data with emerging ideas being generated, which enable comment to be made against the following research objectives:

- *Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.*

Each of the higher-level personnel questioned feel that academic study is important however the level of importance runs along a continuum from a certain level to important to everyone. All respondents agree that there should be an academic base that all professionals should achieve however there is not a consensus of opinion that professionals should have an academic qualification and a professional qualification in order to practice.

The majority of respondents (77%) feel that current academic qualifications meet the needs of becoming a professional. There is also no consensus of opinion from higher-level personnel regarding their preference for informal or formal training. A balanced approach involving both formal and informal learning is the way forward.

- *Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work.*

The results of the subsequent study support those of the preliminary study with higher-level personnel indicating that academic study should link more closely with the workplace and there should be a work-based element included in the curriculum. There is disagreement on whether all workplaces are a suitable environment for learning, the majority of respondents (67%) feeling that any WBL will enhance a student's performance. Higher-level personnel see 'theory into practice' as being a key emerging idea, which is repeated on a number of occasions. One of the five thematic clusters emphasized the importance of partnerships, which are seen as a way of academia and industry working together.

- *Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.*

As with the preliminary study, the higher-level personnel see employability skills and PDP as being important and there is a greater importance placed on both areas by the subsequent study participants compared with the preliminary study participants. Higher-level personnel in both the preliminary and subsequent study interviews have consistently mentioned that experience plays a key part in becoming a professional. This theme is repeated several times within the thematic clusters of emerging ideas.

The vast majority of higher-level personnel feel that the principles of Miller's framework for clinical assessment can be applied to construction management however there is no agreement that the model provides a distinction between competence and performance. There is broad agreement that all of Cheetham and Chivers (1998) core components of professional competence are important with functional competence and personal/behavioural competence being the most important.

All higher-level personnel agree with the list of 'Enhanced employability skills and competencies' presented to them, but they did indicate that an additional set of skills and competencies should be added. Higher-level personnel provide useful comment on the attributes that are important in the role of the professional and that key milestones covering knowledge, experience, competence and identity should be considered when producing a model to enhance capability.

7.4 Students' experience of PDP, skill development, ethics and professional responsibility

7.4.1 Results of the questionnaire to final year built environment students

Figures 7.15 and 7.16 below show a breakdown of the student groups who took the survey (38% of final year students – 123 students). There are no part-time students in the architecture sample. A copy of the questionnaire for construction management students is given in Appendix 6.3.

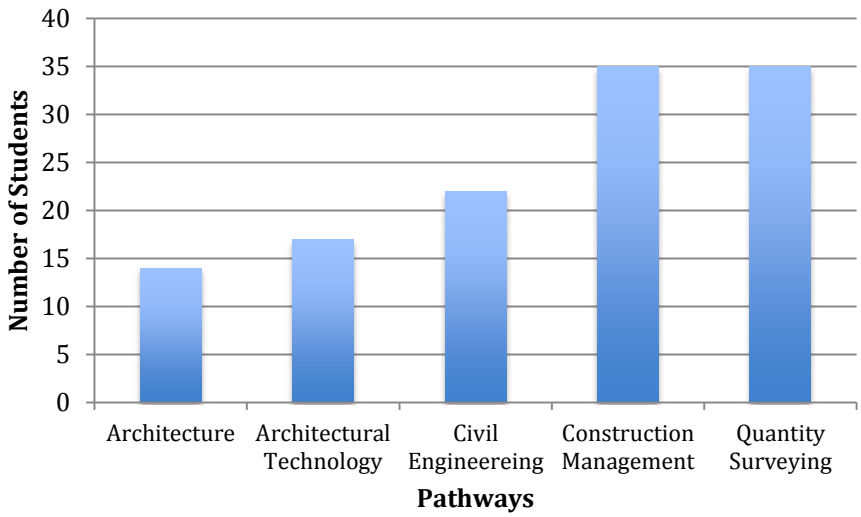


Figure 7.15: Pathways to which students are registered

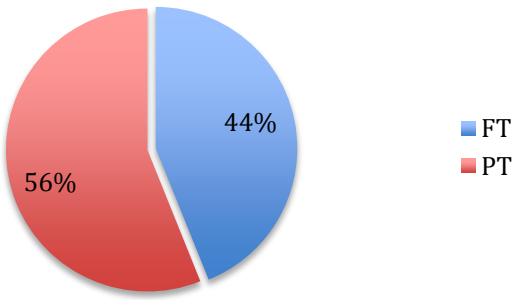


Figure 7.16: Breakdown of students by mode of study

The first question on each of the questionnaires is different depending on the course of study (each questionnaire is colour coded for easy of reporting the data). Students are asked to rate the coverage of a set of skills that course leaders identified from the Course Specification Forms (CSFs) as being covered on the students' course. The rating scale used (1 not covered to 5 definitely covered) indicate that a score of 4 or 5 demonstrates a positive response on behalf of the students with the skill being mainly or definitely covered and anything of 3 or less, the skill is either partially covered or not covered. A combined (full and part-time study) set of mean average results for each overall area (e.g. knowledge and understanding, etc.) is presented in Table 7.18 with a full copy of the extended results based on mode of study in Appendix 7.11.

Table 7.18: Coverage of skill sets (mean average responses) on the CSFs

Area\Course	Architecture	Architectural Technology	Civil Engineering	Construction Management	Quantity Surveying	**All courses**
Knowledge and understanding	3.46	3.57	3.06	3.24	3.31	**3.30**
Intellectual (Thinking skills)	3.43	3.71	2.82	3.11	3.34	**3.24**
Practical skills	3.54	3.95	3.20	3.51	3.96	**3.61**
Transferrable skills	3.48	3.74	2.86	3.31	3.34	**3.33**
Mean average	**3.48**	**3.74**	**2.99**	**3.29**	**3.49**	**3.37**

On the surface, the only skill gap (mean ≤ 3.00) appears to be for civil engineering for the areas of Intellectual (Thinking skills) and Transferrable skills, however if the individual results for each skill within each area are considered then the skill gap is much wider as indicated in Tables 7.19 – 7.22 with all the results for Construction Management being given in Appendix 7.12. Common themes are shown highlighted in yellow.

Table 7.19: Skill gap based on mean average responses for Architecture

Generic area	Skill	Mean average response
Knowledge and understanding	Communication competencies (graphic and modelling techniques, communication)	2.93
Intellectual (thinking) skills	Assimilate, memorise and recall	2.79
Personal skills	Negotiation, leadership and management	2.86
Transferable skills	Learning strategies and study techniques	2.93

Table 7.20: Skill gap based on mean average responses for Civil Engineering

Generic area	Skill	Average mean response
Knowledge and understanding	Built environment	2.68
	Current issues in civil engineering	2.32
	Design and conduct experimental work for engineering issues	2.55
	Health and safety with particular reference to hazard identification and risk prevention	2.59
Intellectual (thinking) skills	Highway deterioration	2.41
	Modelling of engineering problems	2.50
	Research on new solution and new understanding for engineering issues	2.23
Personal skills	Developing and executing research experiment	2.45
	Project Management	2.41
Transferable skills	Appreciation and evaluation of different solutions for the same engineering issues	2.82
	Creativity	2.32
	Information technology and quantitative methods	2.59

Table 7.21: Skill gap based on mean average responses for Construction Management

Generic area	Skill	Average mean response
Knowledge and understanding	Application of IT	2.83
	Data and information	2.69
	Economics	2.74
	Ethical issues	2.91
	Health and safety	2.97
	Law	2.77
	Scientific principles related to construction	2.79
Intellectual (thinking) skills	Assimilate, memorise and recall	2.71
Transferable skills	Learning strategies and study techniques	2.97

Table 7.22: Skill gap based on mean average responses for Quantity Surveying

Generic area	Skill	Average mean response
Knowledge and understanding	Application of IT	2.94
	Ethical issues	3.00
	Health and safety	2.97
Intellectual (thinking) skills	Assimilate, memorise and recall	2.94

The results for civil engineering suggest that there is a greater skill gap in this course area than any other course group with twelve (34%) skill areas achieving a mean average score ≤ 3.00. On closer inspection of the results (Figure 7.17) it can also be seen that nine (30%) construction management skills achieve a mean average score ≤ 3.00. The evidence suggests that students do not feel these skills are being adequately covered on their course although course leaders, based on the information on the CSF suggest that they should be. The development of a model which sees the integration of employability skills alongside PDP and a structured programme of WBL in the curriculum provides a framework for ensuring that students cover the skills necessary to achieve their award and support the achievement of professional competencies and enhanced capability.

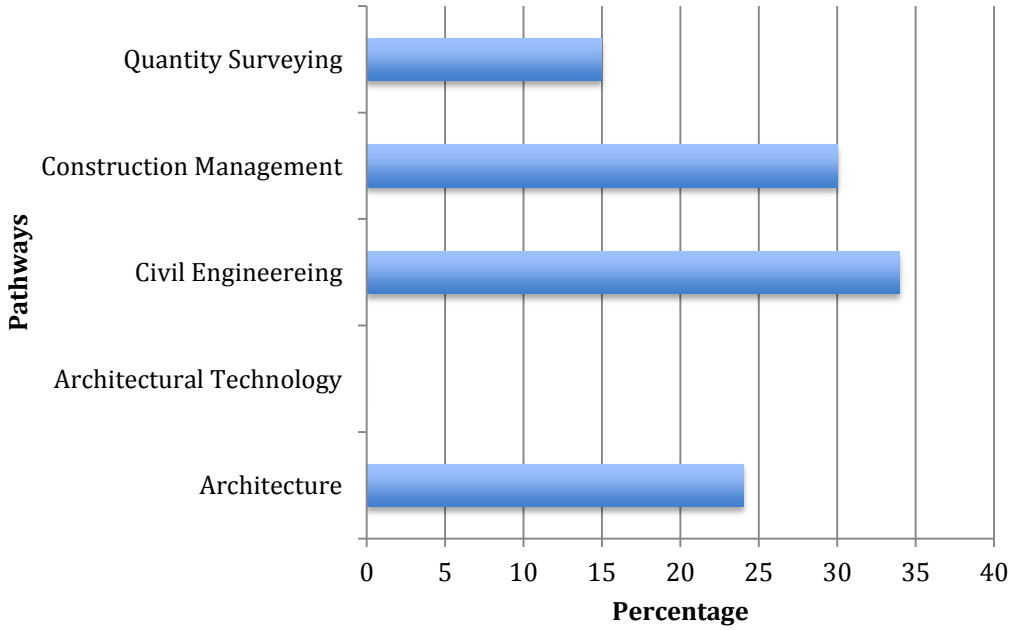


Figure 7.17: % of skills/course achieving a mean average score ≤ 3.00

The information in Tables 7.19 – 7.22 can now be used to produce a draft of the 'super suite of employability skills and competencies'. Table 7.23 provides a summary of the additional information to be added to Tables 4.4 and 7.16 (except those highlighted in blue as they already exist). The architecture and civil engineering specific skills have not been considered as the focus of the research is construction management. Where there is an overlap with

construction management (architecture, civil engineering and quantity surveying) these skills have been included.

Table 7.23: Additional skill gap information to be added to the revised enhanced employability skills and competencies

Generic area	Skill
Knowledge and understanding	Application of IT Data and information Economics Ethical issues Health and safety Law Scientific principles related to construction
Intellectual (thinking) skills	Assimilate, memorise and recall
Personal skills	Negotiation, leadership and management Developing and Executing Research
Transferable skills	Learning strategies and study techniques Information technology and quantitative methods

Question 2 requires the students to give a qualitative response on their definition of 'PDP'. Table 7.24 provides three selected examples from the students.

Table 7.24: Response from students to the definition of PDP

Question	How would you define the term PDP?
Response	*A bespoke plan that is geared towards improving the participant at a specific target - improving overall employability or working towards a professional status* (Construction Management Student) *The development of study/job related skills throughout the course of learning - skills that will aid in the process of obtaining a job later on* (Architecture Student) *How you manage your workload and organise yourself to further improve your skills and knowledge* (Quantity Surveying Student)

The definitions relate very well to those provided by the higher-level personnel with Appendix 7.13 providing a 'Wordle' of both sets of responses. Key themes around self, development of skills, and forethought feature prominently. The comment '*A brief subject that did not evolve into anything worthwhile'* from an architectural technology student suggests that the current way PDP is approached is not working. This links in with comments made previously in the pilot study (Chapter 1) by construction management students, where 59% feel they do not learn anything new during the sessions.

Questions 3, 4 and 5 relate to whether students should study employability skills and PDP as part of their course and whether they have covered them at Anglia Ruskin University. The modal average scores for each of the courses are presented in Table 7.25.

Table 7.25: Modal average scores for each course

Area\Course	Architecture	Architectural Technology	Civil Engineering	Construction Management	Quantity Surveying	**All courses**
Employability skills	5	5	5	5	5	**5**
PDP	5	3	4	4	4	**4**

The students see employability skills as being extremely important (modal average for all courses 5 out of 5) and this can perhaps be explained by the fact that tuition fees are now higher (circa £9000 for a full-time student) and the courses are vocational and as such are related to the world of work. This is a higher figure than higher-level personnel gave (modal average 4 out of 5). PDP is a lower modal average for all courses at 4 out of 5. Again, this is a higher figure than higher-level personnel gave (modal average 3 out of 5).

Figures 7.18 and 7.19 illustrates whether students have covered employability skills and PDP respectively at Anglia Ruskin University.

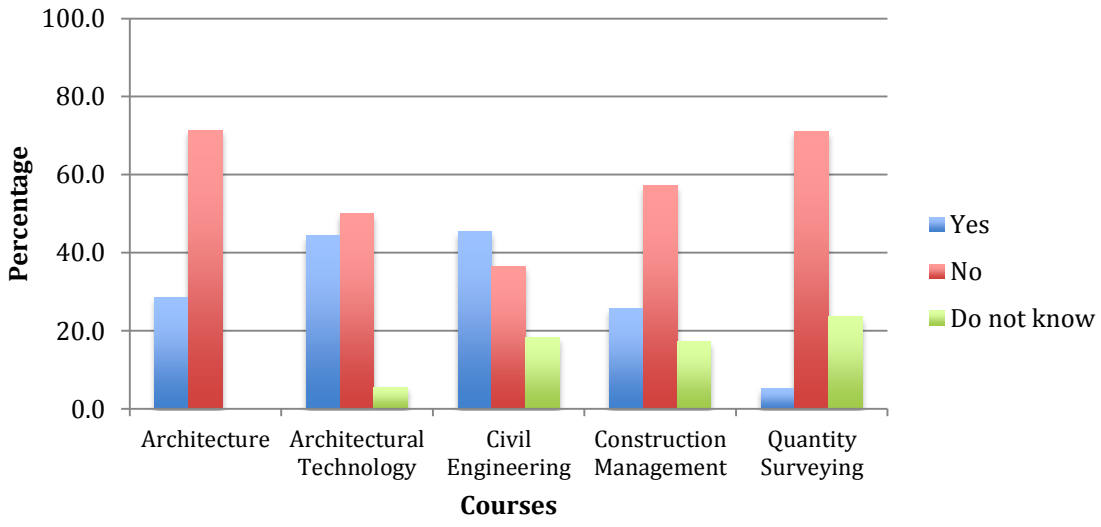


Figure 7.18: Coverage of employability skills on built environment courses

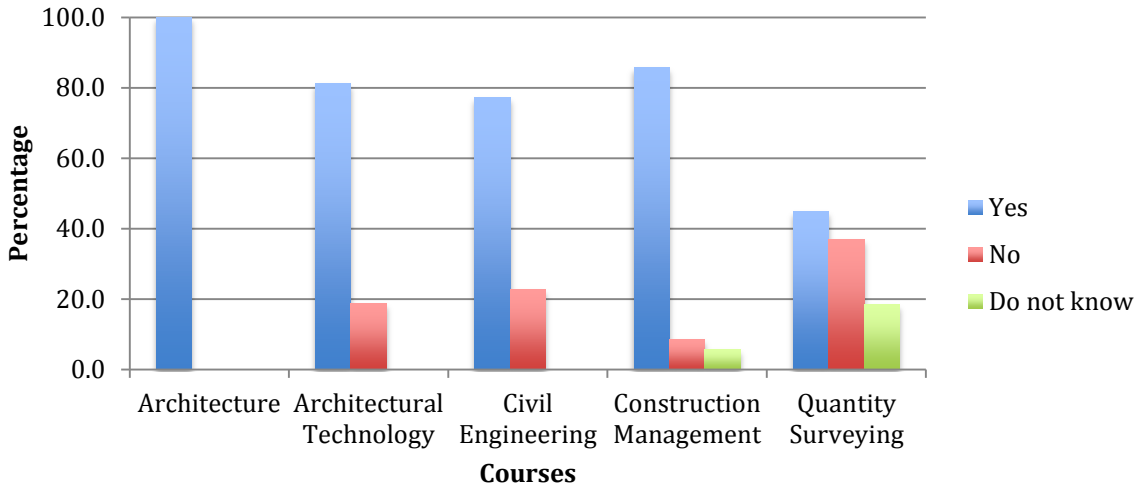


Figure 7.19: Coverage of PDP on built environment courses

The author's own institution places a high priority on making sure employability skills are embedded in the curriculum through its Employability Strategy. Overall only 26% of students feel that employability skills are covered on their courses. This figure is even lower than the Student Experience Survey (SES) result of 57% (identified earlier in Chapter 5). The most satisfied students are civil engineers (45%) but this is still low considering employability is seen as such a high priority by both the students (modal average for all courses 5 out of 5) and the university.

Students see the coverage of PDP as being more positive with 72% of students indicating that they have covered PDP on their course. This compares favourably with the results of the pilot study where 65% of respondents reveal that they have studied PDP before. Indeed for construction management, 86% of students feel they have covered PDP before.

Question 6 focuses on ten areas of career (employability), academic and personal skill development based on information from the University of Bath (2012) and whether they have been helpful to students. Table 7.26 presents the results.

Table 7.26: Areas of career (employability), academic and personal skill development

Theme	Would be helpful	Have been helpful	To be included in the 'super suite of employability skills and competencies'
Interpersonal skills (interacting with people, listening, developing working relationships)	75	46	
Self management skills (time management, objective setting, reflection)	57	64	
Learning (study) skills (note taking, revision plans, effective reading)	55	66	
Written communication skills (report writing, essays, argument construction)	48	73	
Verbal communication skills (presentations, facilitate group discussions)	64	57	
Problem solving skills (analyse information, identify solutions)	62	59	
Career management skills (applications, CVs, interview techniques)	94	27	Career management skills
Information and communication technology skills (use of software applications)	69	52	
Number and data skills (use of a calculator, perform basic arithmetic operations, analyse data, statistical analysis, develop mathematical arguments)	69	52	Quantitative methods
Entrepreneurial and business skills (commercial awareness)	95	25	Entrepreneurial and business skills (commercial awareness)

Of the ten areas of career (employability), academic and personal skill development presented to students, the data suggest that only three areas have been helpful and a further seven areas would be helpful. The strongest views are related to career management skills (94 responses) and entrepreneurial and business skills (95 responses). These two areas are clearly

linked to employability and the high scores reinforce the views expressed by students in Figure 7.18 on the low coverage (26%) of employability skills.

The information in Tables 7.23 and 7.26 is combined (repeat information is removed) and presented in Table 7.27 below. This information will be added to Tables 4.4 and 7.16 to produce a draft 'super suite of employability skills and competencies' (Appendix 7.14).

Table 7.27: Skill gap information to be added to the revised enhanced 'super suite employability skills and competencies'

Area	Skill/competence
Technical and Professional Knowledge (Subject Specific)	Data and information Economics Entrepreneurial and business skills (commercial awareness) Ethical issues Leadership Scientific principles
Graduate Skills (Academic and Employment)	Assimilate, memorise and recall Developing and executing research Learning strategies and study techniques Quantitative methods

The results of question 7 (Figure 7.20) show students' views on the potential benefits of PDP as presented by Cottrell (2010). The yellow bars are linked to personal life, the blue bars to career and professional life and the red bars to academic performance.

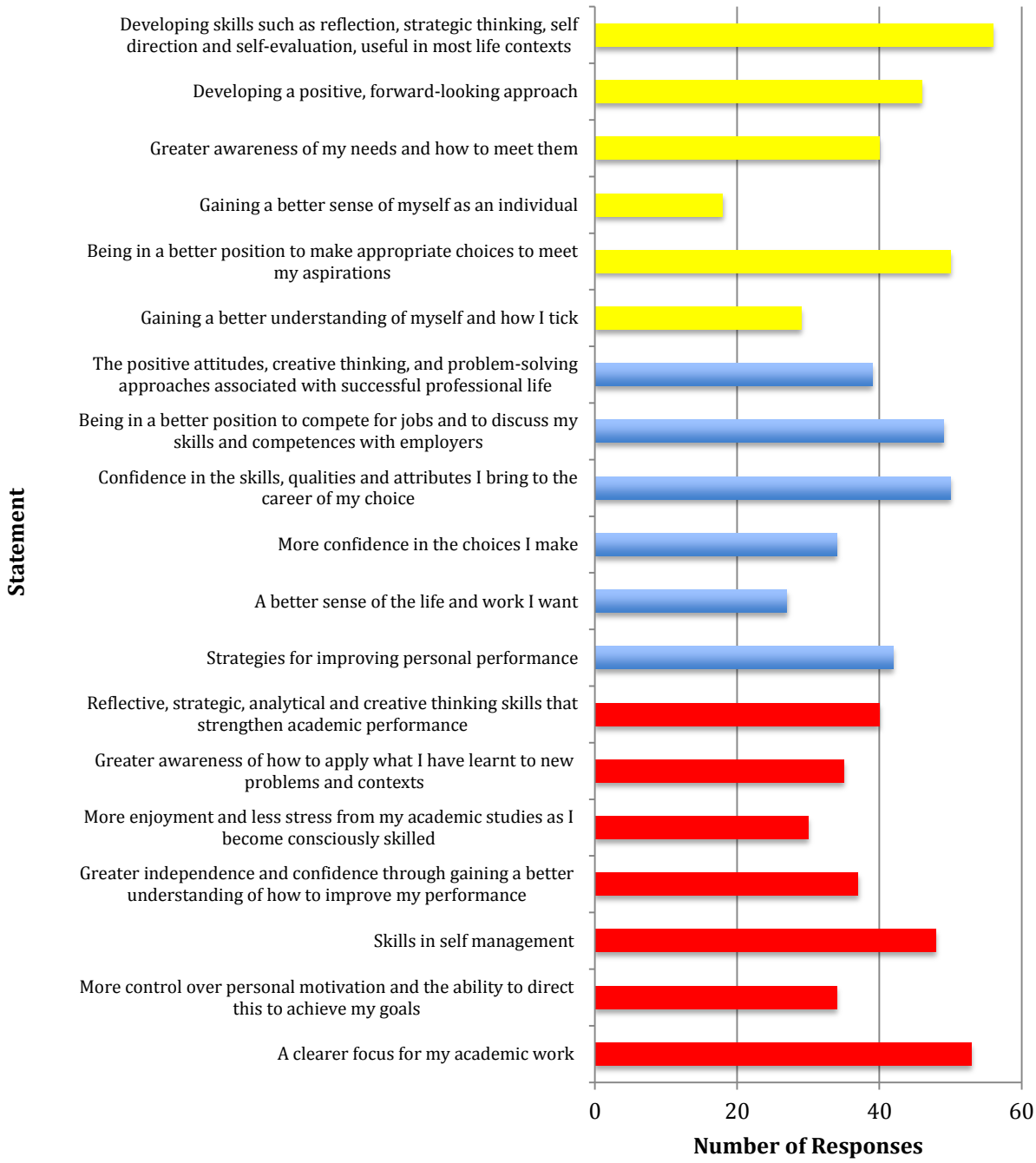


Figure 7.20: Students' responses to the potential benefits of PDP as identified by Cottrell (2010)

The responses from students indicate that the preferred potential benefit of PDP is in 'Developing skills such as reflection, strategic thinking, self-direction and self-evaluation, useful in most life contexts'. This suggests that students are not just thinking of PDP being related to academic performance and professional life but to the wider themes of feeling positive about oneself,

having ownership of one's destiny and the importance of lifelong learning. Cottrell (2010, p.3) sees the benefits of PDP when undertaken in a supported and structured way as 'a much deeper understanding of your performance.' The key themes of a structured approach to the implementation of PDP, enhancing the knowledge curricula with extra-curricular activities, the development of academic skills, and producing students with an employability skills set in readiness for employment, are at the heart of ARU (2011a) Employment Strategy 2011-2014 and ARU (2011b) Learning, Teaching and Assessment Strategy.

Question 8 requires the students to identify their preferred method of PDP delivery. The three models are based on the work of Clegg and Bradley (2006) and Whitlock (2005). Figure 7.21 presents the results with over half (53%) of students preferring PDP to be embedded within the subject specific modules and to have a stand-a-lone PDP module with additional tutorial support. This structured approach is supportive of the model suggested in ARU (2011a, pp.11-12), which states that PDP will:

- 'Introduce students to the opportunities for PDP at the start of their course group of study,
- Provide students with opportunities for personal development at each stage of their course,
- Explain the rationale for personal development at different stages of their course'.

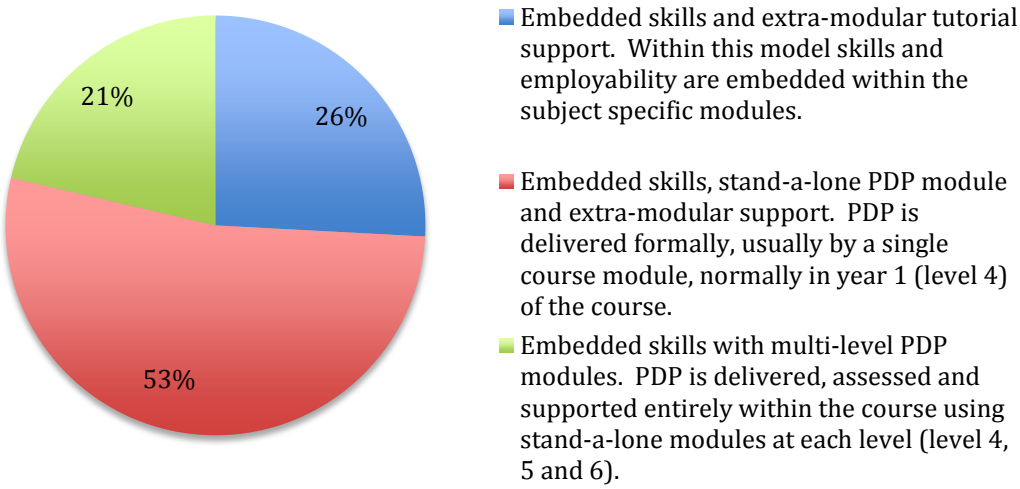


Figure 7.21: Models of PDP (PDP) delivery (Based on the work of Clegg and Bradley, 2006; Whitlock, 2005)

The structured approach does allow PDP to be contextualised to a particular module, but there needs to be a course overview on what personal development activities are taking place as repetition may occur and conflicting views from module tutors could surface.

The results of question 9 add further support to the argument of whether a structured approach is best. Figure 7.22 indicates that the vast majority (76%) of students agree that a structured programme of PDP and professional skill development is likely to enhance capability.

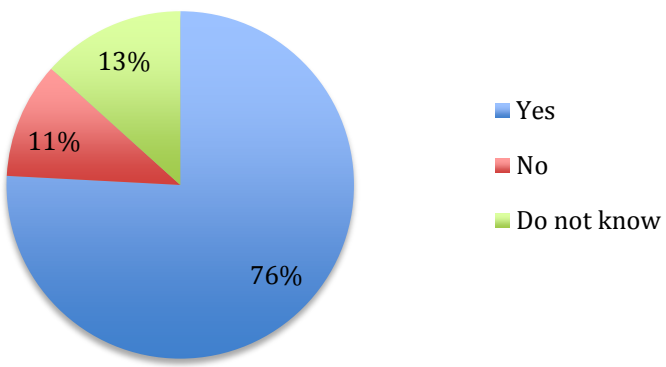


Figure 7.22: Is a structured programme of PDP and professional skill development likely to enhance capability?

The next two questions are used to establish students' views on learning and behaviour. The majority of students (58%) believe that experience rather than instinct influences behaviour and an overwhelming 96% of students agree with Boud, Cohen and Walker (1993, p.2) that 'Learning requires interaction, either directly or symbolically, with elements outside the learner.' These two statements suggest that the addition of WBL through some form of work experience could influence the students' ability to learn and as indicated through the higher-level personnel interviews, this ability could be enhanced.

The final question produces a qualitative response from students on what is meant by ethics and professional responsibility. Table 7.28 provides three selected examples from the list of definitions given by the students.

Table 7.28: Response to ethics and professional responsibility

Question	What is meant by ethics and professional responsibility?
Response	*Behaving and making decisions knowing the responsibility of your actions* (Construction Management Student) *Carrying out your work to a code of conduct in a responsible and sensitive manner (*Architectural Technology Student) *Ethics is moral principles that govern a person or group's behaviour. Professional responsibility is the high level of responsibility that an individual or group has for others* (Civil Engineering Student)

The key themes generated around ethics and professional responsibility focus on standards of behaviour, consideration of others and being responsible for ones actions. These link well with Cheetham and Chivers (1998) model of professional competence which focuses on the importance of 'values and ethics' at a personal and professional level. Pavalko (1971) supports this view and makes the distinction that a 'code of ethics' is developed within a

profession rather than an occupation. In fact two of the specific competencies highlighted by the CIOB as being essential in becoming a professional are exercising professional judgement and responsibility, and a commitment to the code of ethics.

7.4.2 Supplementary questions to final year construction management students

A supplementary set of questions (Appendix 6.6) is given to final year construction management students to establish in the first 3 months of their final year, what they have learnt in the modules they have studied and what skills they have developed. Twenty-seven questionnaires were returned (response rate 61%) with an 85:15 split between part-time and full-time student responses.

Table 7.29 provides a summary of the knowledge the students have learnt in the modules they have studied this semester. This is presented against the learning outcomes of the three modules being studied:

- Major Project (Construction)
- The Construction Business
- Construction Technology and Innovation

Table 7.29: Summary of knowledge learnt in the modules studied this semester

Knowledge	***Module***	***Learning outcome***
How to write a dissertation considering structure, content, formatting and layout	Major Project (Construction)	Demonstrate an understanding of the research process and dissertation structure
How construction businesses are set up and developed	The Construction Business	Employ organisational analysis as a tool in the management of organisational development and change
The financial aspects of a business	The Construction Business	Analyse and critically appraise business performance as measured against targets set within a business and corporate plan
Being able to appraise a business's performance against set targets	The Construction Business	Employ a range of skills and knowledge in managing a business in line with objectives set by themselves
New and innovative construction methods and techniques	Construction Technology and Innovation	Evaluate current construction issues and practices
Timber frame construction	Construction Technology and Innovation	Analyse the various forms and methods of special construction
Up and coming technologies	Construction Technology and Innovation	Synthesise and apply innovative construction technology to the design and production of a building

In all three modules there is clear coverage of the learning outcomes, which suggests that the information on the Module Definition Form (MDF) is covered. Table 7.30 provides a summary of the skills students have developed in the

modules they have studied in semester one. These are presented against the corresponding draft 'super suite of employability skills and competencies', shown earlier in Appendix 7.14.

Table 7.30: Summary of the skills developed in the modules studied this semester

Skills developed in the modules	***Super suite skill/competence***
Working in groups	Working with other (groups)
How to put together written assignments	Learning strategies and study techniques
How to organise and time manage	Time management
How to carry out research	Developing and executing research
Taking off from measurement	
Use of spreadsheets	IT literate
Report writing skills	Literacy skills
Presentation skills	Learning strategies and study techniques
How to write intelligently and with clarity	Literacy skills
How to write a precise, thoughtful and critical analysis	Literacy skills
Business skills	Entrepreneurial and business skills (commercial awareness)

The skills identified as being covered in semester 1 are all currently present in the draft 'super suite of employability skills and competencies' (Appendix 7.14) except *'Taking off from measurement*' (highlighted in yellow). Since this is missing it will now be added to Appendix 7.14 to produce an updated draft 'super suite of employability skills and competencies' (Appendix 7.15).

7.4.3 Results of the questionnaire to all construction management students

The results from the questionnaire to construction management students at Anglia Ruskin University (Appendix 6.5) provide useful data and comment with which to validate the updated draft 'super suite of employability skills and competencies' (Appendix 7.15). Forty-eight questionnaires are returned (response rate 34%) from both full and part-time students. Figures 7.23 – 7.26 provide an overview of the skills and competencies, which students feel should not be included in the list and Table 7.31, identifies which skills and competencies should be added to the list.

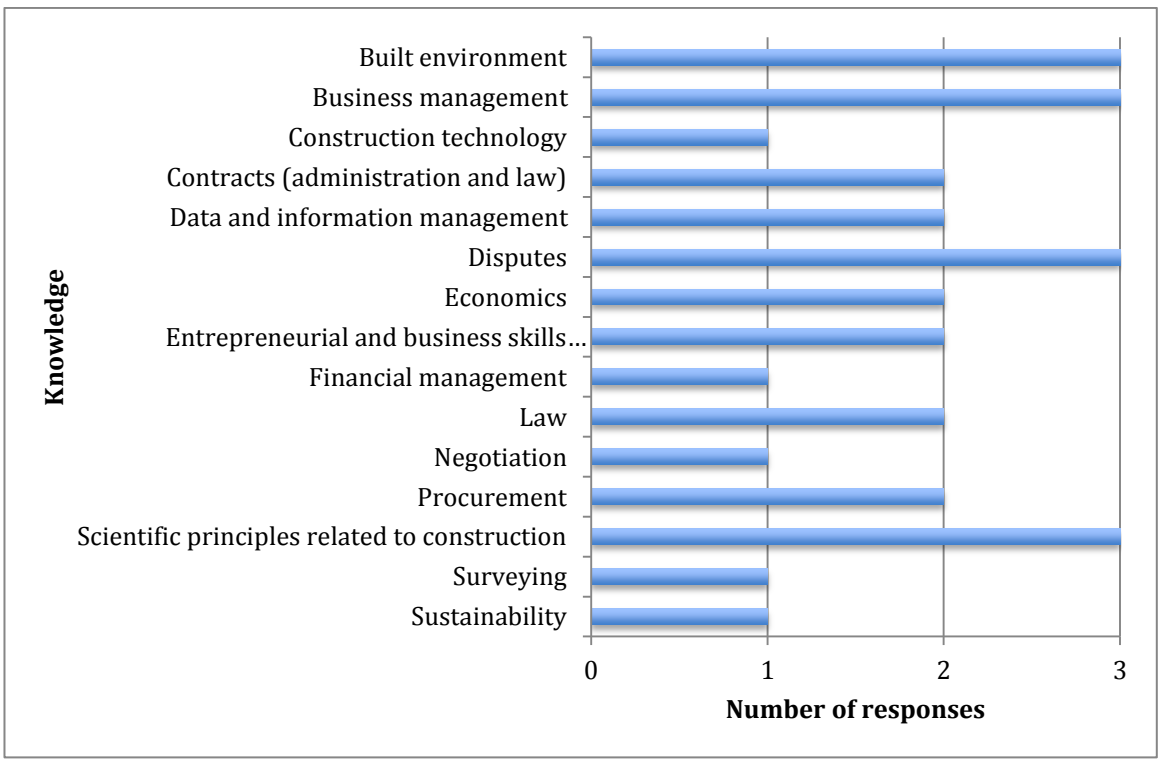


Figure 7.23: Technical and Professional Knowledge (Subject Specific) that students would like to see removed from the draft 'super suite'

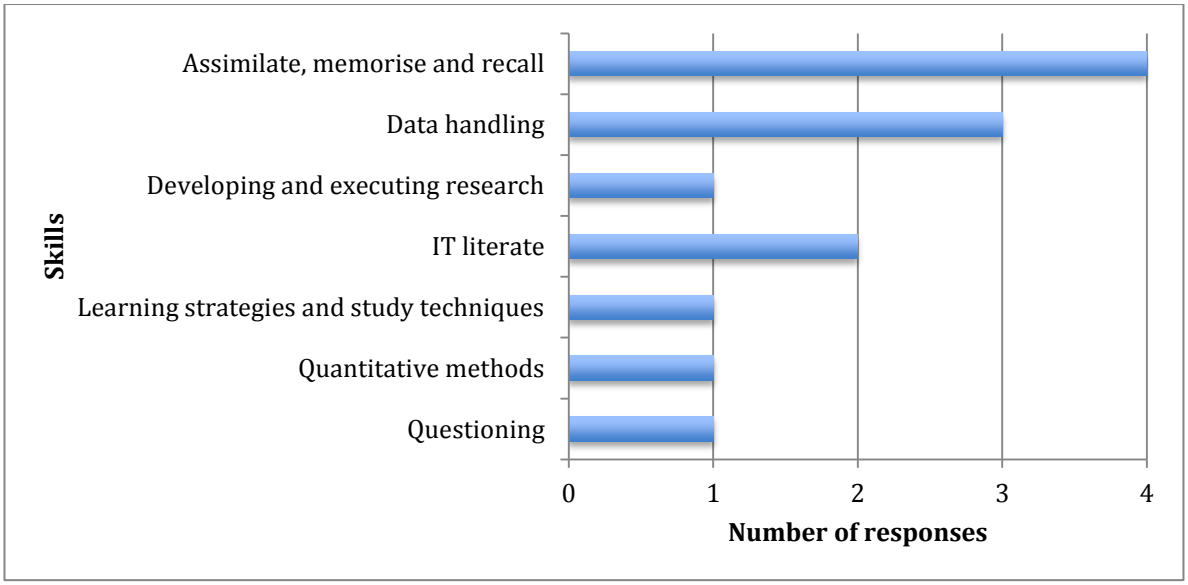


Figure 7.24: Graduate Skills (Academic and Employment) that students would like to see removed from the draft 'super suite'

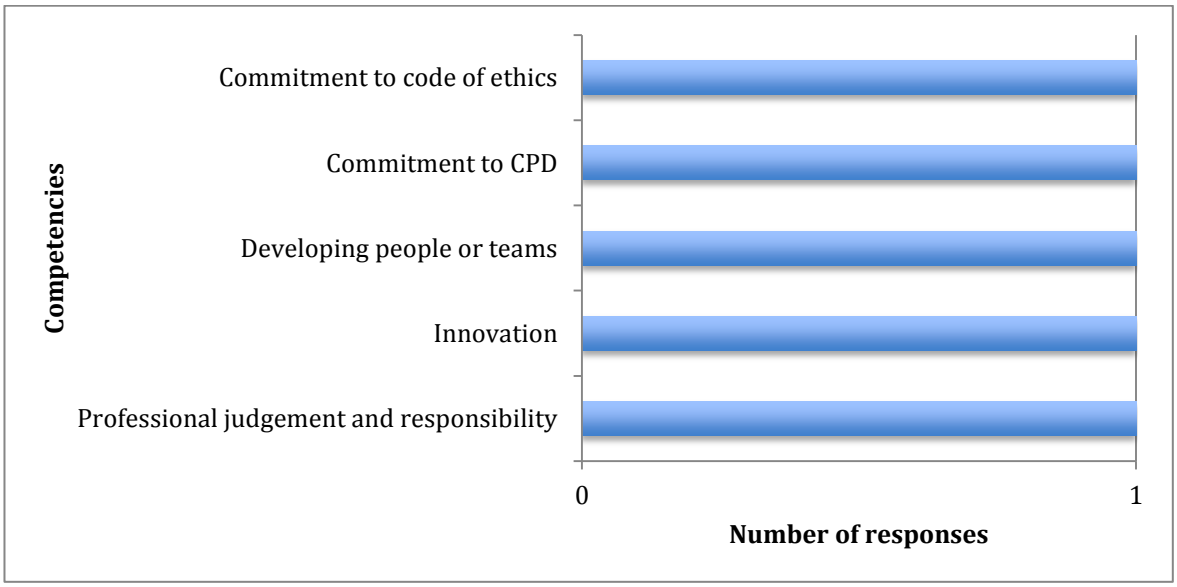


Figure 7.25: Specific Career Competencies (Based on the CIOB Professional Development Programme and the CIOB Professional Review) that students would like to see removed from the draft 'super suite'

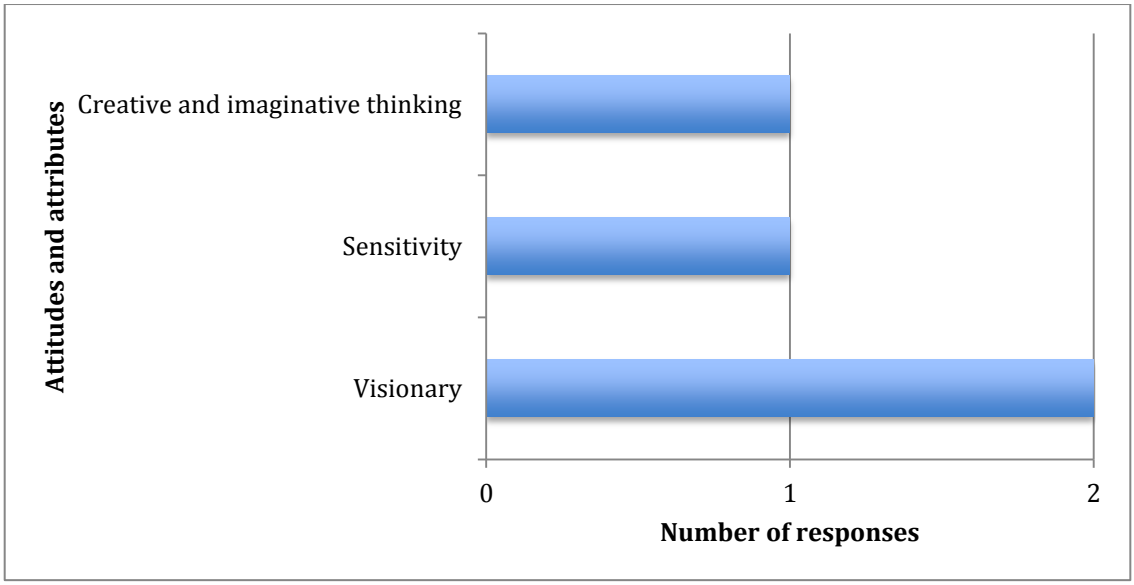


Figure 7.26: Personal Attitudes and Attributes (Expectations of a Professional) that students would like to see removed from the draft 'super suite'

Table 7.31: Additional skills and competencies to be added to the updated draft 'super suite'

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
Auditing systems Common site issues	None	None	None

Of the students who returned the questionnaire, 63% (30 out of 48) agree that no change should be made to the list. The greatest change requested by students, only 8% though (4 out of 48) is to remove the Graduate Skill of '*assimilate, memorise and recall*'. The researcher feels that since the

percentage of students requesting that the employability skills and competencies identified in Figures 7.23 – 7.26 be removed, is fairly low (37%) and no individual skills or competencies scored above 8%, then no change would be made. It is worth noting that the Graduate Skill of '*assimilate, memorise and recall*' was added to the revised enhanced employability skills and competencies at the request of architecture, construction management and quantity surveying students.

With regard to the Technical and Professional Knowledge that needs to be added, the researcher feels that '***auditing systems'*** can cover many different areas of work from health and safety to quality to life cycle costing and should be included in the list and '*common site issues'* should be widened to construction site practice and also be included. Table 7.32 presents the final draft 'super suite of employability skills and competencies'.

Table 7.32: Final draft 'super suite of employability skills and competencies'

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
1. Auditing systems 2. Built environment 3. Business management 4. Contracts (administration and law) 5. Construction related computer applications 6. Construction site practice 7. Construction technology 8. Data and information management 9. Disputes 10. Economics 11. Entrepreneurial and business skills (commercial awareness) 12. Financial management 13. Health and safety 14. Law 15. Leadership 16. Management 17. Measurement 18. Monitoring and controlling 19. Negotiation 20. Planning and organising 21. Procurement 22. Professionalism, values and ethics 23. Scientific principles related to construction 24. Strategic management 25. Surveying 26. Sustainability	1. Analysis 2. Assimilate, memorise and recall 3. Communication 4. Data handling 5. Decision making 6. Developing and executing research 7. Improving ones own performance 8. Inter-personal skills 9. IT literate 10. Judgements 11. Learning strategies and study techniques 12. Literacy skills 13. Numeracy skills 14. Problem solving 15. Quantitative methods 16. Questioning 17. Teamwork 18. Time management 19. Working with others (groups)	1. Commitment to code of ethics 2. Commitment to CPD 3. Communication 4. Decision making 5. Developing people or teams 6. Implementing sustainable construction and development 7. Innovation 8. Knowledge of commercial, contractual and legal issues 9. Leadership and strategic/ financial management 10. Managing information 11. Managing health and safety 12. Managing quality 13. Personal effectiveness at work 14. Planning and organising work 15. Professional judgement and responsibility	1. Adaptability 2. Assertiveness 3. Attention to detail 4. Autonomy 5. Can do approach 6. Common-sense 7. Creative and imaginative thinking 8. Decisiveness 9. Forward thinking 10. Initiative 11. Integrity 12. Intuition 13. Open-mindedness 14. Positive attitude 15. Presentable 16. Professional 17. Reflectiveness 18. Respect 19. Responsibility 20. Self-motivation 21. Sensitivity 22. Visionary

7.4.4 Summary of the questionnaire to final year built environment students, supplementary questions to final year construction management students and the questionnaire to all construction management students

The student questionnaires provide data, which enables comment to be made against the following research objectives:

- *Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.*

The questionnaire to final year built environment students achieves a 38% response rate across five courses (including full and part-time students) with the majority of respondents studying construction management or quantity surveying courses. Students see employability skills as being extremely important however only 26% of students feel that employability skills are covered on their courses despite this being at the heart of the ARU (2011a) Employment Strategy 2011-2014 and ARU (2011b) Learning, Teaching and Assessment Strategy.

The results of the questionnaire to final year built environment students identify a skill gap in 4 out of 5 courses between the set of skills that course leaders identified from the CSFs as being covered on the students' course and those perceived as being present by students. Additional skills and competencies are identified and presented in Table 7.27.

72% of final year built environment students see PDP as being beneficial to developing skills such as reflection, strategic thinking, self-direction and self-evaluation but no clear strategy on how PDP should be delivered emerged from the data. 76% of students feel that a structured programme of PDP and professional skill development is likely to enhance capability and the students

would like to see PDP embedded within the subject specific modules and to have a stand-a-lone PDP module with additional tutorial support.

- *Identify what is included in the process of learning and how students might apply knowledge in both an academic and workplace setting.*

Figure 7.27 shows a flowchart of the processes, literature and personnel involved in producing the final draft 'super suite of employability skills and competencies'. The supplementary set of questions to final year construction management students identify that there is clear coverage of the module learning outcomes and skills. All of these are currently present on the draft 'super suite of employability skills and competencies' (Appendix 7.14) except one *'Taking off from measurement*', which has been added under the subject specific heading of *'Measurement'* and shown in the updated draft 'super suite of employability skills and competencies' (Appendix 7.15).

The results of the questionnaire to all construction management students reveal that 63% of students feel that no change should be made to the updated draft 'super suite of employability skills and competences'. Of the students who feel that skills and competencies should be removed from the list, there is minimal agreement (maximum 8% of students) on the content to be changed, hence no change has been made. Two additional skills and competencies are added which are '*Auditing systems*' and *'Construction site practice'* and these are presented on the final draft 'super suite of employability skills and competencies' (Table 7.32).

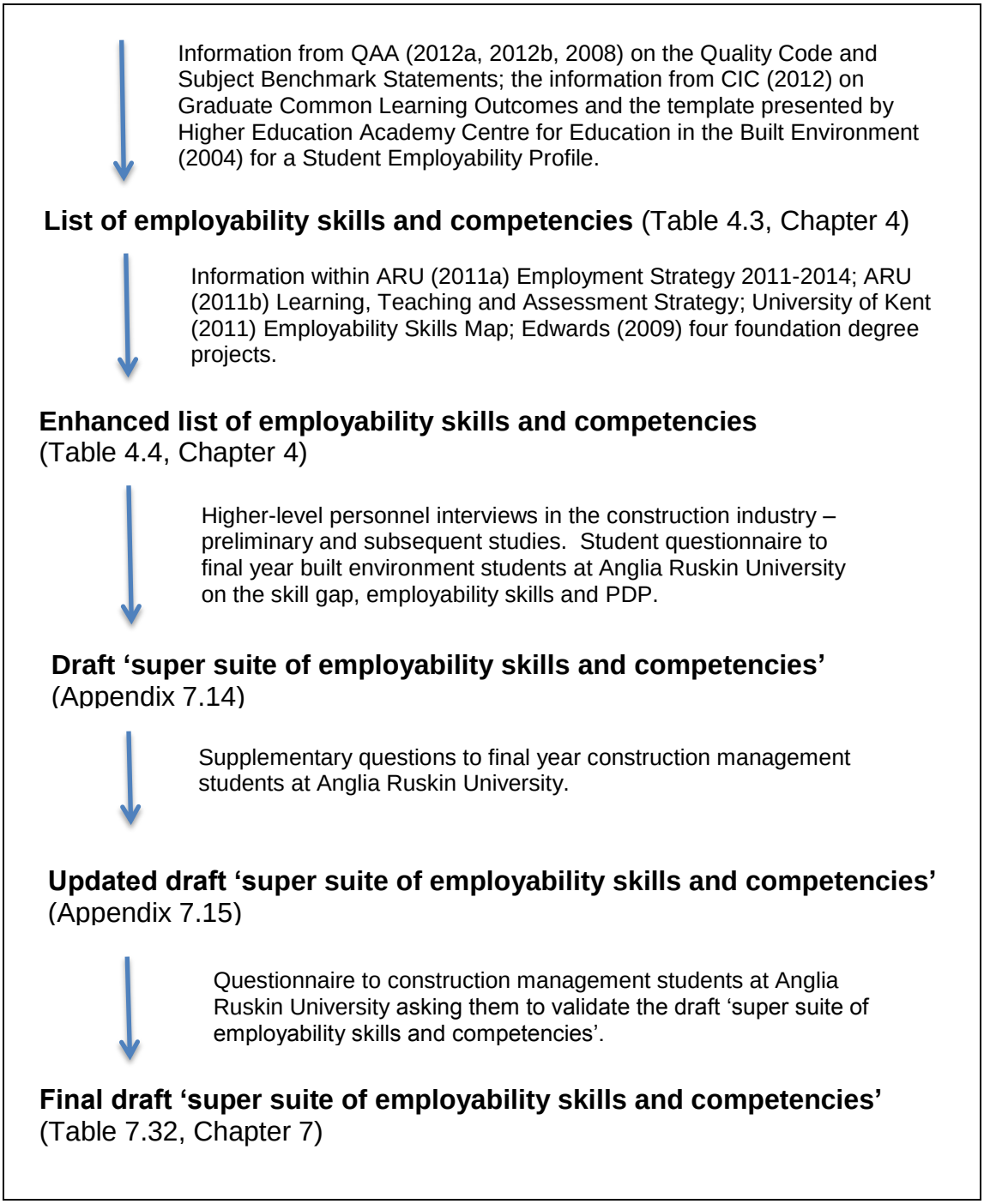


Figure 7.27: Flowchart of the processes, literature and personnel involved in producing the 'super suite of employability skills and competencies'

7.5 Can WBL contribute to an academic qualification in order to prepare students for the world of work?

7.5.1 Results of the built environment pathway leader questionnaire

The results of the questionnaire to pathway leaders at UK universities offering a BSc Construction Management course (response rate 43% - 15 out of 35) are presented below. Out of the 35 institutions, 17 advertise sandwich courses for full-time students. 100% of institutions surveyed have full-time undergraduate students with 60% (9 out of 15) also having part-time undergraduate students. Only 27% (4 out of 15) of full-time students undertake WBL as part of their academic studies with only two institutions indicating that they give credit for the WBL element.

Of the institutions that have part-time students, 56% (5 out of 9) allow students to use their experience towards their academic studies, however only three of these institutions give credit for WBL. 80% of respondents believe WBL can contribute to an academic award.

The following comments were worthy of note:

- *The student can draw upon skills and knowledge gained at work and apply these towards their qualification.*
- *As soon as a student begins a construction course we need to establish what professional body RICS/CIOB/ICE/RIBA they want to join and drive the WBL from the Professional Body competencies.*
- *By demonstrating the application of theory in practice within a realistic vocational environment (i.e. under pressure with relevant constraints).*
- *By using a portfolio of evidence from the workplace.*

Figure 7.28 shows the level of importance (1 little importance to 5 extremely important) of reflective practices in WBL. The vast majority of respondents see

reflective practices as being important which supports the views of Graham, Rhodes and Shiel (2006, p.172) and the use of the workplace as a learning environment.

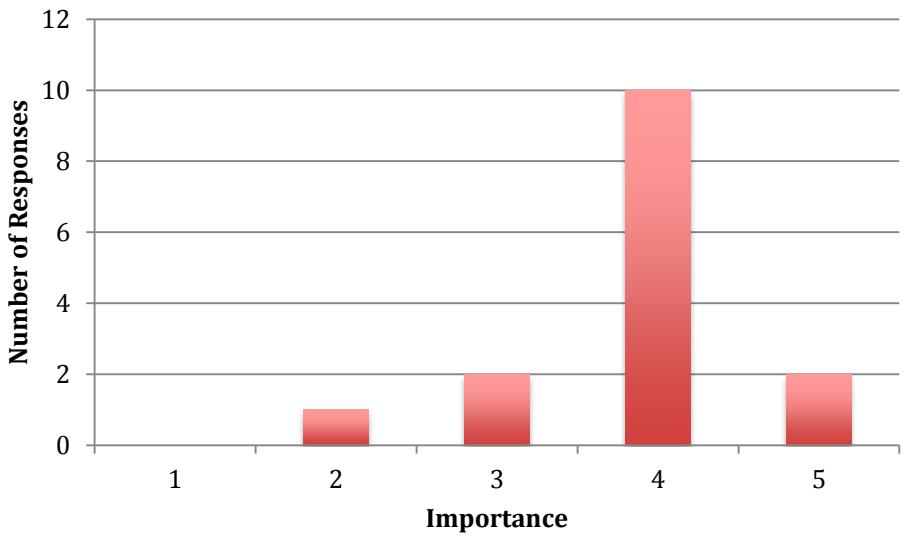


Figure 7.28: Level of importance (1 little importance to 5 extremely important) of reflective practices in WBL

The questionnaire to built environment pathway leaders asks for their opinion on the researcher's five key themes (derived from the work of Boud and Solomon, 2001; Margaryan, 2008) that may be present in the design of a WBL curriculum as outlined in Chapter 4. Table 7.33 presents the mean average results, which show there is agreement with the researcher that the key themes of a WBL curriculum are important.

Table 7.33: Mean average results of the key themes that may be present in the design of a WBL curriculum

Key themes	Mean average response (1 totally disagree to 5 totally agree)
Relevance of the curriculum in meeting student/employer needs using work-based activities to facilitate learning is important	4.07
The curriculum needs to be flexible to recognise individual needs through an individual learning plan	3.40
The learning experience is key to achieving student/employer satisfaction	4.33
The learners starting point with regard to current competencies should be examined	3.80
Learning outcomes are important in a WBL course	4.07

The questionnaire is used to identify the level of support for the potential benefits of a WBL curriculum for both students and employers as identified in Chapter 4. Appendix 7.16 presents the mean average results, which show there is agreement of the potential benefits, which are greater for students (mean average 3.88) than employers (mean average 3.59). This could explain the reluctance that students find with some employers to give them work experience.

7.5.2 Summary of the built environment pathway leader questionnaire

The questionnaire achieves a 43% response rate with all institutions having full-time undergraduate students but only 60% having part-time undergraduate students as well. Less than a third (27%) of full-time students undertake WBL as part of their academic studies and only two institutions give credit for the WBL element. There is a greater acceptance from institutions for part-time students to use their experience towards their academic studies (56%), however this practice does not extend widely to full time students who undertake work experience with 49% (17 out of 35) of institutions advertising sandwich courses for full-time students.

The majority (80%) of respondents feel that WBL can contribute to an academic award and the data suggests that they are agreement with the researcher's five key themes that may be present in the design of a WBL curriculum. The themes are:

- Relevance of the curriculum in meeting student/employer needs using work-based activities to facilitate learning is important.
- The curriculum needs to be flexible to recognise individual needs through an individual learning plan.
- The learning experience is key to achieving student/employer satisfaction.
- The learners starting point with regard to current competencies should be examined.
- Learning outcomes are important in a WBL course.

Finally, respondents indicate that there is a greater potential benefit to students than employers from WBL, which suggests that a far greater number of institutions (17 out of 35) should offer a sandwich option. Maybe as the construction industry recovers from the recession, both universities and employers will support this option.

7.6 Integrated model of PDP and WBL to enhance traditional academic theory

7.6.1 Development of an integrated model

Evidence from the literature (professional competence, the process of learning and the acquisition of knowledge, WBL and PDP) and extensive data collection through questionnaires and structured interviews has established a set of criteria, which is used to produce a model for integrating PDP and WBL to enhance traditional academic theory. The criteria (Appendix 7.17) are listed under five key reference points or headings: learning environment, PDP, WBL, skill development and professional competence. These headings are chosen as they link closely to the aim of the research, which is to:

> ***Explore the extent to which the potential academic processes of PDP and WBL, as part of an undergraduate degree, can enhance achievement of professional competencies and capability.***

The criteria, final draft 'super suite of employability skills and competencies' (Table 7.32) and the five thematic clusters influence the model's development. The information in Appendix 7.17 provides details of the criteria used in the development of the model thus focusing the mind on the key themes and their point of reference. Appendix 7.18 shows the draft model, which covers knowledge and skill activity within the BSc (Hons) Construction Management course.

The existing BSc (Hons) Construction Management course at Anglia Ruskin University is revised to take account of the findings of the research with eight new modules totalling 135 credits proposed. Appendix 7.19 identifies how the new BSc Construction Management course at Anglia Ruskin University meets the researcher's five key themes (derived from Boud and Solomon, 2001; Margaryan, 2008) of a WBL curriculum.

7.6.2 Results of the focus groups

Two focus groups are invited to provide feedback using coloured sheets on the seven areas (final draft 'super suite of employability skills and competencies', course structure diagrams, proposed model of knowledge and skills activity, skills and competencies matrix, links between the modules, module definition forms for the proposed new modules, mapping of modules to the CIOB Education Framework) identified in the focus group brief (Appendix 6.9) using the methodology defined in Chapter 6. In focus group 1, there are five participants; two are higher-level personnel in the construction industry and three are former students from the Department of Engineering and the Built Environment at Anglia Ruskin University. The focus group discussions lasted 82 minutes. In focus group 2, there are eight participants; three are academic staff in the Department of Engineering and the Built Environment at Anglia Ruskin University and five are current students from the construction management degree course, also in the Department of Engineering and the Built Environment at Anglia Ruskin University. The second focus group discussions lasted 77 minutes.

An example of the coloured sheet feedback from focus group 1 is given in Appendix 7.20. A detailed analysis is given below of the participant's views on seven areas of information in relation to the following research objective:

> *Propose an integrated model of PDP and WBL to enhance traditional academic theory.*

1. Final draft 'super suite of employability skills and competencies'

The focus groups are in agreement with the final draft 'super suite of employability skills and competencies' and each of the four areas presented with the following comment supporting this point '*Each heading is to the point and focuses on the good points and each list covers a good range of aspects'*

(Focus group 2). Focus group 1 however, feel that the single biggest issue relates to the area 'Professional Attitudes and Attributes' and it should be presented first rather than last with the following comment '*Favouring personal attitudes and attributes as column 1'* (Focus group 1) supporting this view. The rationale is based on fact that these traits or characteristics should be developed at an early stage in university and not thought of as a bolt-on activity following university. This suggestion has been implemented in the final version of the 'super suite of employability skills and competencies'. Focus group 2 feels that the column 'Professional Attitudes and Attributes' might be less subjective if it is labelled 'Individual Personalities'. After careful consideration of the opinions from the focus group, this suggestion has not been implemented as the researcher feels that the current title provides a more appropriate heading for the content.

Focus group 1 identifies three missing skills and competencies in the super suite with *project management*, *courage* and *relationships* to be added to the list. Focus group 2 indicates that one additional item should be included which is *equality of opportunity*. Debate took place in both focus groups on whether 'visionary' should be removed from the list and whether it could be developed, however since there was no consensus of opinion, 'visionary' will remain.

2. Course structure diagrams

There is general agreement between the focus groups that the proposed course structure diagram for the BSc Construction Management course is an improvement on the existing BSc Construction Management course. *'It's good to see that professional, personal and academic skills is the first module which prepares you for the course in addition to what your behaviour should be like in industry'* (Focus group 1). Participants are happy that the main themes of the CIOB Education Framework (Sustainability, The Construction Environment, Construction Management, Construction Technology, Health, Safety and Welfare, Ethics and Professionalism, Dissertation/ Project) are covered throughout the course.

The inclusion of a research skills module at level 5 before students take the level 6 research project module is welcome *'Good to have developing and executing research module but if it is too soon in the course students feel it is too remote from their dissertation'* (Focus group 2). Focus group 1 indicates that the module '*Surveying should be retitled Site Engineering Surveying'* (Focus group 1). Debate took place in focus group 2 on the order of the modules and which modules should be taught alongside other modules '*Some modules may be better being introduced in semester two rather than semester one*' (Focus group 2). As there is no consensus of opinion then the structure diagrams are to remain as presented to both groups.

3. Model of knowledge and skills activity

Focus group 1 are pleased with the 'model of knowledge and skill activity'. The participants feel that the use of a 'learning log' is particularly useful and *'the model should focus on the person and their development, prepare students for employment – in the main it does this'* (Focus group 1). Focus group 2 is also pleased to see a learning log *'Like the idea of a learning log to enable further progression to chartered status'* (Focus group 2). There is agreement between the focus groups that Welcome Week should be where the 'learning log' is introduced. Focus group 1 indicates that the model should *show 'what attitude and attributes are needed through university to a professional career'* (Focus group 1) and as such the model needs to include all four areas from the 'super suite of employability skills and competencies'. This is a valid suggestion and the model has been amended. Focus group 2 feels that *'The learning log should be on-line'* (Focus group 2). This suggestion is outside the scope of this research project for implementation but it is valid nonetheless.

4. Skills and competencies matrix

The knowledge, skills, competencies, attitudes and attributes matrix is well received and the use of '*colour coding'* (Focus group 1) and *'colour-coded key'* (Focus group 2) improved the presentation, however *'the headings need further explanation as to why each of the four areas are covered'* (Focus group 1).

This comment refers to the information in the final column of the skills and competencies matrix and to aid the reader an explanation has been included. A further observation reveals that it would be helpful *'to show how the skills are applicable to a profession e.g. construction manager'* (Focus group 1). Focus group 2 had considerable debate on whether the skills and competencies are *'developed or assessed or both'* (Focus group 2). This suggestion is outside the scope of this research project for implementation but it is valid nonetheless.

5. Links between the modules

The participants of both focus groups are pleased to see this information, linking one module to another, however '*the presentation could be improved by putting the table into a flowchart as it feels a little disjointed'* (Focus group 1). Focus group 2 would like the information to go further and *'Would prefer the modules linked to the construction management roles and show all the skills a construction manager needs to know'* (Focus group 2). This suggestion provides additional information, which the focus group feels would benefit students.

6. Module definition forms for the proposed new modules

The Module Definition Forms (MDFs) are seen by the focus groups as being *'Well structured, very clear and informative and gives a good outline of each module – would be happy to receive this form'* (Focus group 1). Focus group 1 also commented that the MDFs 'need to explain some of the headings that are used' (Focus group 1). Discussion followed and suggestion that the *'explanation could go in the module content'* (Focus group 1) is made. Focus group 2 supports this idea with the following comment *'including the learning log information on the MDF'* as *'a good idea'* (Focus group 2). Unfortunately, the suggested amendments to the framework of the MDFs are not possible without approval of the Academic Office at Anglia Ruskin University.

7. Mapping of modules to the CIOB Education Framework

The focus groups welcomed the documentation given to them with the comment '*Good to know how the course is set out between full and part-time study'* (Focus group 2) supporting this view. They are pleased that the new proposed BSc Construction Management course covered the seven themes in the CIOB Education Framework. Again, there is a need to *'improve the presentation by colour coding the headings and separate the years using a space or thicker line'* (Focus group 1). A revised mapping document has been produced.

Within the seven areas noted above, twenty key themes are identified (Appendix 7.21). These are reduced down to sixteen key themes by putting similar words/phrases together (Appendix 7.22). Four thematic clusters evolve from the key themes by grouping like-minded ideas together into single words or phrases that best encompass the content (Table 7.34). The cluster headings are:

- Accessibility of Information
- Course Structure
- Graduate Skills Framework
- Personal Skill Development

Table 7.34: Key themes and thematic clusters identified from the focus groups

Key Themes (implicit and/or explicit)	Thematic cluster
Application and assessment of skills	Graduate Skills Framework
Attitude and behaviour/individual personalities	Personal Skill Development
Clarity	Accessibility of Information
Colour coding	Accessibility of Information
Development of soft skills	Personal Skill Development
Equality of opportunity	Personal Skill Development
Importance of relationships	Personal Skill Development
Learning log (on-line)	Graduate Skills Framework
Level of competence	Graduate Skills Framework
Module size	Course Structure
Order, content and relevance	Course Structure
Own transferrable assets	Graduate Skills Framework
Personal template/checklist	Graduate Skills Framework
Presentation	Accessibility of Information
Relationships	Personal Skill Development
Student management plan	Graduate Skills Framework

Accessibility of Information

The key ideas generated in this cluster make sure information is accessible to students, employers and academic colleagues. The information should be written and presented in a way so that it can be easily understood, with text and diagrams to illustrate points made.

Course Structure

The focus groups considered the new structure layouts and debated the order, location and relevance of the modules. Discussion on the 15/30 module credit structure took place and it was identified that the current module credit structure

is too restrictive at Anglia Ruskin University. The focus group containing academic staff sees modules having a minimum value of 10 credits.

Graduate Skills Framework

The Graduate Skills Framework for Construction Management is an illustration of how the model can be advanced and provides a framework through which students are able to develop and record a broad range of skills and experiences whilst undertaking their degree. It contains a number of elements:

- Academic study
- Learning log
- Skills audit
- Personal tutoring
- Career planning

The two key elements of the Graduate Skills Framework for Construction Management are:

- Final 'super suite of employability skills and competencies' (Table 7.35)
- Final model of knowledge and skills activity within the BSc (Hons) Construction Management course (Table 7.36)

Table 7.35: Final 'super suite of employability skills and competencies'

Personal Attitudes and Attributes (Expectations of a Professional)	Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)
1. Adaptability 2. Assertiveness 3. Attention to detail 4. Autonomy 5. Can do approach 6. Common-sense 7. Courage 8. Creative and imaginative thinking 9. Decisiveness 10. Forward thinking 11. Initiative 12. Integrity 13. Intuition 14. Open-mindedness 15. Positive attitude 16. Presentable 17. Professional 18. Reflectiveness 19. Respect 20. Responsibility 21. Self-motivation 22. Sensitivity 23. Visionary	1. Built environment 2. Business management 3. Contracts (administration and law) 4. Construction related computer applications 5. Construction technology 6. Data and information management 7. Disputes 8. Economics 9. Entrepreneurial and business skills (commercial awareness) 10. Financial management 11. Health and safety 12. Law 13. Leadership 14. Management 15. Monitoring and controlling 16. Negotiation 17. Planning and organising 18. Procurement 19. Professionalism, values and ethics 20. Project management 21. Scientific principles related to construction 22. Strategic management 23. Surveying 24. Sustainability	1. Analysis 2. Assimilate, memorise and recall 3. Communication 4. Data handling 5. Decision making 6. Developing and executing research 7. Improving ones own performance 8. Inter-personal skills 9. IT literate 10. Judgements 11. Learning strategies and study techniques 12. Literacy skills 13. Numeracy skills 14. Problem solving 15. Quantitative methods 16. Questioning 17. Relationships 18. Teamwork 19. Time management 20. Working with others (groups)	1. Commitment to code of ethics 2. Commitment to CPD 3. Communication 4. Decision making 5. Developing people or teams 6. Implementing sustainable construction and development 7. Innovation 8. Knowledge of commercial, contractual and legal issues 9. Leadership and strategic/ financial management 10. Managing information 11. Managing health and safety 12. Managing quality 13. Personal effectiveness at work 14. Planning and organising work 15. Professional judgement and responsibility

Table 7.36: Final model of knowledge and skill activity within the BSc (Hons) Construction Management course

Qualification Descriptors (QAA UK Quality Code for Higher Education, 2012)	Personal Attitudes and Attributes	Technical and Professional Knowledge	Graduate Skills	Specific Career Competencies	Activity integrating PDP and WBL to enhance traditional academic theory
Level 6 • a systematic understanding of key aspects of their field of study, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of defined aspects of a discipline • an ability to deploy accurately established techniques of analysis and enquiry within a discipline • conceptual understanding that enables the student: ➢ to devise and sustain arguments, and/or to solve problems, using ideas and techniques, some of which are at the forefront of a discipline ➢ to describe and comment upon particular aspects of current research, or equivalent advanced scholarship, in the discipline • an appreciation of the uncertainty, ambiguity and limits of knowledge	Adaptability Autonomy Can do approach Common sense Initiative Courage Creative and imaginative thinking Open-mindedness Positive attitude Presentable Professional Reflectiveness Relationships Respect Responsibility Self motivation Sensitivity Visionary	Built environment Business management Construction technology Data and information management Entrepreneurial and business skills (commercial awareness) Financial management Health and safety Leadership Management Monitoring and controlling Planning and organising Professionalism, values and ethics Project management Strategic management Sustainability	Analysis Assimilate, memorise and recall Communication Decision making Developing and Executing Research Improving ones own performance Inter-personal skills Literacy skills Numeracy skills Problem solving Quantitative methods Questioning Teamwork Time management Working with others (groups)	Commitment to code of ethics Commitment to CPD Communication Decision making Developing people or teams Implementing sustainable construction and development Innovation Personal effectiveness at work Professional judgement and responsibility	***Learning log*** • Completion record of knowledge gained, skill development and specific career competencies achieved with evidence of critical reflection • Becoming a full member of a professional body • Further study • CPD activity ***Study skills*** • Creative thinking • Enhancement of reflective skills • Extending research skills • Strategic thinking ***WBL*** • Employer/placement induction checklist • Work placement learning agreement • Risk assessment • Evidence of how personal/professional knowledge and skills is applied in the workplace • Skills design and development • Employer engagement • Evaluation of WBL experience ***Personal tutoring***

• the ability to manage their own learning, and to make use of scholarly reviews and primary sources (for example, refereed research articles and/or original materials appropriate to the discipline).					• Individual and group tutorials • Progress management and exit planning
Level 5 • knowledge and critical understanding of the well established principles of their area(s) of study, and of the way in which those principles have developed • ability to apply underlying concepts and principles outside the context in which they were first studied, including, where appropriate, the application of those principles in an employment context • knowledge of the main methods of enquiry in the subject(s) relevant to the named award, and ability to evaluate critically the appropriateness of different approaches to solving problems in the field of study • an understanding of the limits of their knowledge, and how this influences analyses and interpretations based on that knowledge.	Attention to detail Decisiveness Forward thinking Intuition Reflectiveness	Auditing systems Built environment Business management Construction related computer applications Construction technology Contracts (administration and law) Data and information management Disputes Financial management Health and safety Law Leadership Management Measurement Monitoring and controlling Negotiation Procurement Planning and	Analysis Communication Data handling Decision making Developing and Executing Research Developing people and teams IT literate Literacy skills Numeracy skills Problem solving Quantitative methods Questioning Working with others (groups)	Communication Decision making Knowledge of commercial, contractual and legal issues Leadership and strategic/financial management Managing quality Planning and organising work	***Learning log*** • Evaluation of each semester's performance • Year two reflection • Personal profile (skills, abilities and personal qualities) ***Study skills*** • Choosing a job • Placement opportunities (employment fair) • CV, application form and letter writing • Interview techniques • Research skills covering ethics, literature and database searches and quantitative methods • Problem solving • Working as a team and developing people skills ***Personal tutoring*** • Individual and group tutorials • Progress management

		organising Professionalism, values and ethics Scientific principles related to construction Sustainability			
Level 4 • knowledge of the underlying concepts and principles associated with their area(s) of study, and an ability to evaluate and interpret these within the context of that area of study • an ability to present, evaluate and interpret qualitative and quantitative data, in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of their subject(s) of study.	Can do approach Forward thinking Positive attitude Professional Reflectiveness Responsibility Self motivation	Auditing systems Built environment Construction site practice Construction technology Data and information management Economics Health and safety Law Management Scientific principles related to construction Sustainability Surveying	Analysis Assimilate, memorise and recall Communication Data handling Improving ones one performance IT literate Learning strategies and study techniques Literacy skills Numeracy skills Questioning Teamwork Time management	Commitment to CPD Communication Managing heath and safety	***Learning log*** • Identification of current knowledge and skill base • PDP priorities and goal setting • What will success look like • Evaluation of each semester's performance • Year one reflection ***Study skills*** • Becoming an independent learner • Essay writing • Information retrieval • IT skill development • Literature searches • Library skills • Mind maps • Note taking • Report writing • Reflective skills • Presentation skills • Time management ***Personal tutoring*** • Individual and group tutorials • Progress management

Welcome Week/Induction		Introduction to the course, modules and personal tutoring The learning log			***Study skills*** • Devil's guide to learning • Learning styles • Becoming a professional (student membership) • Improving your listening skills • How to work in groups

An outline version for students of the Graduate Skills Framework for Construction Management is shown in Appendix 7.23 and it contains the following documentation:

- Final ‘super suite of employability skills and competencies’
- Final model of knowledge and skills activity
- Final skills and competencies matrix
- Proposed structure diagrams for the BSc (Hons) Construction Management course (FT/PT)
- Links between each of the modules
- Final mapping of modules to the CIOB Education Framework
- Yearly review template

The Graduate Skills Framework overlaps with the thematic cluster of ‘personal skill development’ as this provides the formal record along with a student’s transcript of an improvement in performance and development.

Personal Skill Development

The focus groups discussed a number of personal skills, which students should develop throughout their course. Higher-level personnel within focus group 1 are particularly keen for potential employees, particularly full-time students to be aware of the importance of personal skills and to have made significant progress towards their implementation. The thematic cluster is concerned with the development of these skills, a record of which will be identified in the Graduate Skills Framework for Construction Management.

The final question to the focus groups is ‘*Would the implementation of the model of knowledge and skill activity and revised curriculum narrow the gap to professional membership of the Chartered Institute of Building (CIOB)?’*

Focus group 1 indicate the ‘*model being proposed brings things together better*’

and *'it should produce more rounded students, which may lead to better candidates for CIOB membership'*. Focus group 2 add the following comment *'If it would make it easier for students to join the CIOB then, yes*', however, focus group 2 are concerned with the *'currency of the learning log'* but *'even if the evidence becomes out of date, it would still be useful.'*

7.6.3 Summary of the focus groups

The focus groups are extremely positive in their feedback on the seven areas of information presented to them. There is overall agreement that the final 'suite of employability skills and competencies' contain relevant information although additional skills and competencies could be added. The proposed BSc Construction Management course is an improvement on the existing course with a real emphasis on personal, professional and academic development running throughout the course. The model of knowledge and skill activity is welcome but it needs to show the entire specific career competencies and the professional attitudes and attributes.

The knowledge, skills, competencies, attitudes and attributes matrix is easy to follow but the headings need further explanation. Showing the links between the modules is a good idea however the presentation needs to be improved probably using a diagram rather than a table. Additional information on how the modules link to the construction management roles would add value to the overall model. The eight proposed new modules are well structured, clear and a positive addition to the course. Mapping of the modules to the CIOB Education Framework provides useful information, however the clarity of presentation could be improved.

The focus groups provide confirmation that the information presented in relation to the final research objective is in the main, appropriate, well presented, easily understood and of value to students, employers and academic colleagues.

Propose an integrated model of PDP and WBL to enhance traditional academic theory.

Key themes and subsequent thematic clusters using the headings: accessibility of information, course structure, Graduate Skills Framework for Construction Management and personal skill development; are identified in the data. The focus groups feel that the implementation of the model of knowledge and skill activity and revised curriculum would go someway to narrowing the gap to professional membership of the CIOB.

7.7 Reflection on the effectiveness of the research methods used

The research uses a mixed methods approach to data collection. Questionnaires provide mainly quantitative data whereas the structured interviews and focus groups provide qualitative data. All three methods of data collection are an appropriate choice resulting in breath and depth of data obtained. The effectiveness of each method of data collection together with what has been learnt about each of them is indicated in Table 7.37 below.

Table 7.37 – Effectiveness of the methods of data collection

Method of data collection	Strength	Weakness	What has been learnt about the methods of data collection
Questionnaires (Students)	A significant amount of quantitative data is obtained from final year built environment students, which enables a comparison between different student groups to be made. The questionnaires allow descriptive statistics to be produced.	Occasionally, qualitative responses would have been useful where the views of students could have been explored in more depth e.g. students' feelings and opinions on PDP delivery.	The questionnaire is able to provide considerable data quickly, however careful thought is needed when deciding on the how the questions will be asked and what sort of response might be given. It is important early on, before the questionnaire is given to students to determine how the results will be presented and the type of analysis to be used.
(Pathway leaders)	The views of pathway leaders at UK universities offering a BSc Construction Management course could be sought, which enables data to be obtained relatively quickly following the outcome of the preliminary interviews.	It would have been useful to ask the pathway leaders to expand on their answers e.g. why module credit is not generally given for work-based activity.	The questionnaire to pathway leaders raises a number of supplementary questions, which would have been useful to explore further.
Structured interviews	The interviews with higher-level personnel enable detailed questions to be asked which result in an in-depth response. The interview process also allows the interviewer to clarify any terms or points that the interviewee did not understand e.g. What professional training[1] have you had? [1] *Professional training refers to skills and knowledge attained*	The time taken to carry out the interview, transcribe it and put it in a useable format is time-consuming and resource intensive. The higher-level personnel interviews could have been extended to other professions in the built environment sector e.g. architects. This would have given another perspective to the answers provided.	The interviews allow for a one to one discussion to take place. They also ensure that there is an interaction in the data gathering process between academia and industry, which adds value to the research. Preparation is key to the interview process being successful. It is important to brief the higher-level personnel before the interviews take place. The participant

	for both personal development and career advancement.		information sheet is extremely valuable in this process. Finally, when dealing with higher-level personnel it is important not to assume that they understand all of the educational jargon and the information is presented in a clear and concise way.
Focus groups	A useful way to obtain through discussion, a range of views from different groups of participants. The focus groups provide informed comment at little cost on the integrated model of PDP and WBL, which assists greatly in the production of a Graduate Skills Framework for Construction Management.	The transcribing of the focus group meetings is extremely time-consuming and at times difficult to establish what has been said when there are multiple conversations happening at the same time. Additional comments from other groups would have added value to the focus group meetings e.g. involving support staff from across the University at faculty level and wider in student services, library and the academic office.	The focus groups require considerable planning prior to the meetings and it is important to have a good idea of the information that may result and how that output can be captured e.g. using coloured sheets of paper to capture no more than five comments for each of the seven areas being discussed is useful.

The project design has been adjusted in a number of ways to take account of the unforeseen problems that arose during the course of the research. Firstly, it is important to establish that the sample of higher-level personnel used in the subsequent study worked for a particular size of company (following the preliminary study) to make sure there is appropriate representation across the construction industry. This means some companies were rejected before the interviews took place because they did not fit the sampling strategy. Secondly, a supplementary set of questions are given to final year construction management students to establish what they had learnt and the skills they developed in the first three months of their final year. The questionnaire is given out because the researcher feels that the previous questionnaire given to

all final year built environment students did not fully capture the additional thoughts from construction management students on their previous study. Finally, the original intention is to have one focus group rather than two separate groups however as indicated in Section 6.5.4 bringing large numbers of participants together into one location at a specific time would have caused additional problems, not least having the appropriate representation of the different groups and being able to capture everyone's thoughts.

7.8 Chapter Summary

The aim of this chapter has been to present the results from the three methods of data collection (questionnaire, structured interviews and focus groups) and to ensure that the five research objectives have been satisfied. The chapter provides a detailed analysis and discussion of these results. The evidence cited shows that each research objective has been met with the following summaries and conclusions provided.

- *Identify what is included in the process of learning and how students might apply knowledge in both an academic and workplace setting.*

Evidence from the student questionnaire identifies that students see learning by doing as a preferred way of learning with 82% of students questioned supporting the view of Schön (1983) that reflection plays a key part in the learning process. 85% of students see learning as a cognitive process and emphasising professional practice within their study enhances learning.

Another significant factor in their learning is the importance of experience and the evidence suggests that full-time students would benefit from some form of WBL. This should enable academic mode 1 knowledge to be related to tacit mode 2 knowledge.

Students are also in general agreement with the 'super suite of employability skills and competencies' presented to them. Two additional graduate skills are added to the list.

- *Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.*

The majority of students (72%) see the benefit of undertaking PDP as part of their academic studies and would like to see it embedded within the subject specific modules as well as having a stand-a-lone PDP module with additional tutorial support. PDP can be used to develop skills such as reflection, strategic thinking, self-direction and self-evaluation. It must be carried out in a structured way with 76% of students agreeing that a structured programme of PDP and professional skill development is likely to enhance capability.

Students see employability skills as being extremely important however only 26% of students feel that employability skills are covered on their courses despite this being at the heart of ARU (2011a) Employment Strategy 2011-2014 and ARU (2011b) Learning, Teaching and Assessment Strategy. The results of the student questionnaire identify a skill gap between the set of skills that course leaders identified from the CSFs as being covered on the students' course and those perceived as being present by students.

Higher-level personnel see PDP as an important part of academic study but emphasise the need to be related to the workplace. Employability skills should be linked to PDP and embedded in the curriculum.

- *Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work.*

The consensus of opinion from higher-level personnel is that an academic award should have a work-based element but they were unsure how employers could be involved in the assessment process. A key emerging idea from the structured interviews is relating 'theory into practice'. This is reinforced through one of the five thematic clusters, which emphasize the importance of academia and industry partnerships. Higher personnel in both the preliminary and subsequent study interviews indicate the importance experience plays in becoming a professional. This theme is repeated several times within the thematic clusters of emerging ideas.

Built environment pathway leaders at UK universities offering a BSc Construction Management course feel that reflective practices are important in WBL. The majority (76%) of pathway leaders feel that WBL can contribute to an academic award and the data suggests that they are in agreement with the researcher's five key themes that may be present in the design of a WBL curriculum. A further analysis of the data from the questionnaire to pathway leaders established that there are greater potential benefits to students than employers from WBL.

- *Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.*

The preliminary and subsequent study of structured interviews with higher-level personnel supports students' views that academic study and the workplace should be part of the overall learning environment. In the majority of cases higher-level personnel indicate that having an academic and professional qualification is seen as essential. They are of the opinion that current academic

qualifications generally meet their needs and that of becoming a professional, but are undecided on whether formal/informal training is the way forward.

- *Propose an integrated model of PDP and WBL to enhance traditional academic theory.*

A 'super suite of employability skills and competencies' needed for study and employment is produced. The four areas covered are:

- Professional Attitudes and Attributes (Expectations of a Professional)
- Technical and Professional Knowledge (Subject Specific)
- Graduate Skills (Academic and Employment)
- Specific Career Competencies (Based on the CIOB Professional Development Programme and Professional Review)

Based on the 'super suite', evidence from the literature and extensive data collection, a set of criteria is developed which enables the production of a model integrating PDP and WBL to enhance traditional academic theory. Feedback from the focus groups indicates that they are in general agreement with the information presented to them. A small number of additional skills and competencies are added to the final draft 'super suite'. The changes made to the BSc Construction Management course are extremely positive. All four areas from the 'super suite of skills and competencies' should appear on the model of knowledge and skill activity. Presentation and clarity of information is highlighted by the focus groups as an area for improvement especially with the table showing the links between the modules and the mapping documentation to the CIOB Education Framework. Additional module mapping to the construction management roles would be of benefit. All eight proposed new modules received positive comment and are a useful addition to the course.

Key themes are identified in the data and these enabled four thematic clusters to be developed, which emphasize the importance and relevance the model of knowledge and skill activity and revised curriculum would have. The focus

groups feel this would go someway to narrowing the gap to professional membership of the CIOB.

In conclusion, it is recommended that a curriculum should be developed to ensure WBL is available to all students, especially full-time, as it has the potential to enhance the students' capability. PDP and employability skills are seen as important by employers but need to be embedded, through a structured approach in the curriculum. To develop competence, a student should cover a range of tasks and a broad spectrum of specific and general knowledge and skills on their course. It can be deduced from the results of the student questionnaire that experience plays a significant part in the learning process and students see the application of theory to practice as being extremely important. The integration of employability skills alongside PDP and a structured programme of WBL in the curriculum provide a model for supporting the development of professional competencies and enhanced capability.

8.0 Conclusions and Recommendations

8.1 Introduction to the chapter

The previous chapters reveal, analyse and discuss the theoretical perspectives around professional competence (Chapter 2), the process of learning and the acquisition of knowledge (Chapter 3), WBL (Chapter 4) and PDP (Chapter 5). The case for the chosen paradigms, methodological approach and research methods employed (Chapter 6) are made. Relevant research findings (Chapter 7) are revealed and through appropriate data analysis these are presented.

This chapter provides a summary of the conclusions emanating from the research and discusses the findings in light of the literature, methodology and research methods. In order to present these conclusions the chapter takes the reader back to the beginning and identifies why the topic was chosen, what the research sought to discover (aim of the research), and what the boundaries are and why those boundaries were chosen. The chapter goes on to examine the extent to which the research objectives have been met in the context of the conceptual framework and identifies recommendations for stakeholders and further work.

The chapter describes the contribution to knowledge made by this research project and finally identifies the limitations of the study and provides a personal reflection on the research process.

8.2 General observations

The topic has been chosen because current practice in the author's own institution demonstrates that there is no link at department level between PDP and WBL, leading to professional membership. Chapter 1 highlights the issues concerning fully accredited built environment courses at Anglia Ruskin University, which are failing to optimize the capture of skills and competencies

needed for study, employability and professional responsibility.

The gap in knowledge linking PDP, professional skill development and WBL is explored within the boundaries set by the research aim, which is to:

> ***Explore the extent to which the potential academic processes of PDP and WBL, as part of an undergraduate degree, can enhance achievement of professional competencies and capability.***

The initial research boundaries are set within the context of undergraduate study and built environment education, which provides a wide rich source of data from several disciplines covering architecture, architectural technology, building surveying, civil engineering, construction management, quantity surveying and real estate management. To enable a more focused study, the research then adopts a narrower approach through the discipline of construction management. This provides an opportunity to link the research to the requirements of the CIOB Professional Review leading to Chartered Membership.

The research is mainly set in a positivistic paradigm with mixed methods research following a survey based methodological approach. Mixed methods are considered an appropriate strategy as it allows the research to be tackled from a range of perspectives bringing together qualitative and quantitative methods. The thoughts of current built environment students at Anglia Ruskin University and pathway leaders at UK universities offering a BSc Construction Management course are obtained through the use of a questionnaire, which produces a breadth of considerable data. Structured interviews with higher-level personnel in the construction industry enable more detailed thoughts and opinions to be captured. Focus groups provide an opportunity to receive critical feedback on the model of PDP and WBL to enhance traditional academic theory.

The conceptual framework provides a mechanism of linking the literature, methodology and the results. The initial conceptual framework is too narrow and

does not fully articulate the extent of the research. The refined conceptual framework shows the main areas within the research project, the interrelationship between these areas and the boundaries associated with the project. The conceptual framework provides a clear context within which to carry out the research, draw on the research findings and reach defendable conclusions and recommendations for further work.

The presentation of the results within Chapter 7 has shown the wide spectrum of data collection methods and the usefulness of using qualitative and quantitative techniques, which have led to the triangulation of the results. Reliability and validity of the research data and subsequent results have been addressed by good planning and design which ensured the data collection is robust and the methods of data presentation and analysis have led to statements, supported by the evidence. These statements have defended and challenged published research.

Finally, the research has demonstrated a gap in knowledge exists and the integrated model of PDP and WBL has the potential to enhance traditional academic theory. The following section presents the main conclusions emanating from the research and resulting stakeholder recommendations are stated.

8.3 Conclusions and stakeholder recommendations in relation to the research objectives

The conclusions drawn from the research are presented against each of the research objectives. In identifying the conclusions, the purpose of each objective is first stated then appropriate conclusions presented against key themes within each objective. A bulleted list of recommendations related to each key theme provides an agenda for action by stakeholders (Department of Engineering and the Built Environment at Anglia Ruskin University, other HE institutions offering a BSc Construction Management course and the CIOB).

Objective 1 – Identify what is included in the process of learning and how students might apply knowledge in both an academic and a workplace setting.

This objective provides a starting point for investigating the theoretical perspectives of the research. It enables the researcher to gain an understanding of educational theory and use it to identify how students learn, their preferred learning environment and how knowledge can be applied in the different settings of theory and practice. The conceptual framework indicates the importance learning theories play in developing a firm foundation of student knowledge, skills and competencies.

Process of learning: This involves 'doing' or 'being done to' and is a lifelong process that does not stop once formal education has ended. Learning is about finding out something you did not know before and there is much debate and many texts on how students learn and which way is best. This research identifies four learning theories (behaviorism, cognitivism, constructivism, humanism) and two models (reflection and experiential learning) presented in Chapter 3 as having a role to play and a 'one size fits all' policy is not appropriate as students are different and have individual needs and expectations. A good teacher recognises those needs and effective teaching takes account of the students' learning styles and their attributes and attitudes. The research reveals 'learning by doing' as the preferred way of learning for final year students in the Department of Engineering and the Built Environment at Anglia Ruskin University.

A clear link is established between the learners' learning experience and their environment, which is supported by the quantitative data from the student questionnaire. The data suggests that experience of professional practice within the students' study enhances learning. Higher-level personnel in the construction industry agree with the suggestion and indicate that full-time students would benefit from WBL and also agree with Dreyfus and Dreyfus (1980) that 'concrete experiences' enhance knowledge.

Reflective practice emerges as a central theme from student and higher-level personnel comments in encouraging the development of new knowledge and understanding. The two areas of 'reflection-in-action' and 'reflection-on-action' support the development of professional competence with 82% of students questioned agreeing with the view of Schön (1983) that reflecting on one's experience is an accepted way of learning new knowledge. The literature (Cheetham and Chivers, 1998; Whitlock, 2005) supports the claim suggesting structured processes in the curriculum can develop self-reflection and enhance the achievement of skills needed by graduates.

Views from students via a questionnaire and higher-level personnel via structured interviews demonstrate overwhelming support for the final 'super suite of employability skills and competencies' that emanated from the literature (QAA, 2012a, 2012b, 2008; CIC, 2012; Higher Education Academy Centre for Education in the Built Environment, 2004; ARU, 2011a; ARU, 2011b; University of Kent, 2011; Edwards, 2009). The 'super suite' provides the backbone and focus of the integrated model of PDP and WBL to enhance traditional academic theory.

The emphasis placed by staff on professional practice is established through the student questionnaire. The majority of students (77%) identify professional practice as being emphasised by academic staff during their studies.

Stakeholder recommendations are:

- ***Teaching needs to take into account the different learning needs and styles of students.***
- ***A variety of different approaches to disseminating information to students should take place.***
- ***Academic staff must be in encouraged to improve their methods of teaching to ensure classes have structure with innovative teaching methods being introduced which encourage students to***

work as independent learners.

- ***Ensure that the good practice of emphasizing professional practice in the curriculum continues across all built environment courses at Anglia Ruskin University.***

Application of knowledge in an academic and workplace setting: This is crucial to effective performance, a view recognized by Cheetham and Chivers (1998) in their model of professional competence. Practical knowledge is closely linked to students' skills, which in turn is linked to performance. Full and part-time students in the Department of Engineering and the Built Environment at Anglia Ruskin University prefer to 'learn by doing' which suggests the practical application of an activity, seeing theory being put into practice, is an important concept of learning. However, both full and part-time students do not feel they are able to relate mode one theoretical knowledge to mode two tacit knowledge. The skill acquisition model proposed by Dreyfus and Dreyfus (1980) identifies the importance of developing knowledge and skills in an academic setting and applying these to the workplace to solve new problems. The model does not indicate where this academic setting stops and a workplace setting begins. If competence in the skill acquisition model is referring to experience then the final year at university is between level 2 (advanced beginner) and level 3 (competent), but it is not clear. The skill acquisition model would benefit from the inclusion of reflective practices (Schön, 1983), which are known to be useful in professional learning and development.

The research concludes that academic study should be linked more closely with the workplace. Higher-level personnel emphasize the importance WBL has in developing the ability of students to see theory being applied in practice. The use of academic and industry partnerships providing a structured approach to WBL reinforces the message. The key text of Dreyfus and Dreyfus (1980) provides an authoritative view on the process of skill development and the more experienced a student becomes, less is the dependency on abstract principles and more on concrete experiences. Evidence from the research supports this view.

Stakeholder recommendations are:

- ***The application of theory into practice should be encouraged in the Department of Engineering and the Built Environment at Anglia Ruskin University and where applicable, across the HE sector.***
- ***All full-time students should undertake a period of WBL.***
- ***Course material given to students during Welcome Week/Induction should include information on the structure of the course, how one module relates to another module and how theory links to practice.***
- ***Extend the current practice of academic/industry partnerships in the Department of Engineering and the Built Environment to include greater employer involvement in the curriculum.***

Objective 2 – Establish whether a structured programme of PDP and professional skill development, which includes reflective practices, is likely to enhance students' capability.

This objective is included in the research as it enabled literature to be investigated around PDP and professional skill development activity and whether the concepts identified have support from students and higher-level personnel. The effect of reflective practices is identified in the conceptual framework in the context of enhancing students' capability.

PDP: This fulfills both an academic and workplace requirement in enabling students to think about what they want out of university, employment and how this affects their chosen career path. Higher-level personnel highlight the importance of the PDP process and reveal support for a structured programme of PDP but indicate it needs to be relevant to the workplace. The literature (Cottrill, 2010; QAA, 2009; Edwards, 2005; Wojtczak, 2002) supports this view with evidence from final year built environment students concluding it should be linked to WBL.

The research concludes that PDP needs to be the central theme in the students' studies and the literature (ARU, 2011a; Corkill, 2006; Whitlock, 2005) reveals that PDP needs to cover academic and employability skills, however the majority of students (74%) in the Department of Engineering and the Built Environment indicate that the current curriculum at Anglia Ruskin University does not have employability explicitly highlighted in the curriculum. Built Environment students prefer PDP to be embedded within the subject specific modules and to have a stand-a-lone PDP module with additional tutorial support.

Stakeholder recommendations are:

- ***Ensure students see the benefit of PDP by making it a central theme in the curriculum.***
- ***Encourage the development of a learning log, skills audit and PDP portfolio (covering academic study, personal tutoring and career planning) as part of a Graduate Skills Framework for Construction Management.***

Professional skill development: The research concludes that this is an important element of preparing students for work, however implementation of practice is varied and there needs to be a clear process of how these skills are to be developed and captured. The literature (Clegg and Bradley, 2006; Whitlock, 2005) sees a portfolio of evidence providing an opportunity to demonstrate coverage and competence. The use of technology in helping students develop an e-portfolio has the potential to provide skill development opportunities, reflective activities and future career planning. Higher-level personnel see the development of employability skills as being an essential part of the higher education curriculum.

The employability of graduates and the development of higher-level skills in the workplace are key drivers from the literature (ARU, 2011a; Leitch, 2006;

Dearing, 1997) supporting the enhancement of the students' academic skills. Models by Clegg and Bradley (2006) and Whitlock (2005) offer an opportunity to introduce professional skill development to the construction management curriculum at Anglia Ruskin University. The research concludes that the three models of PDP proposed by Clegg and Bradley (2006) should not be seen as three separate models (a simplistic approach) but as three aspects of a students' PDP portfolio.

Stakeholder recommendations are:

- ***The 'super suite of employability skills and competencies' must be adopted for construction management students and tailored to meet the needs of other built environment students at Anglia Ruskin University. Other HE institutions should consider adopting the 'super suite'.***
- ***Students to be briefed during Welcome Week/Induction on how personal skill development will be encouraged during the course, where specific study skill activities will be used and the expectations placed on students to develop higher-level skills.***
- ***Two new modules 'Personal, Professional and Academic Development' and 'Professional Studies' to be developed.***

Reflective practice: The literature (Whitlock, 2005) suggests that reflective practices are seen as a necessary activity to enable students to develop academically, personally and professionally. The CIOB Professional Review requires candidates to reflect, catalogue their experience and to demonstrate through reflective practices that they have the appropriate knowledge, skills and behaviour. Reflective practices are seen as an important aspect of a student's career plan with final year built environment students indicating, using descriptive statistics that PDP can be used to develop skills such as reflection, strategic thinking, self-direction and self-evaluation. The research supports the view of Whitlock (2005), which indicates that reflective practices should be encouraged through both the curriculum and portfolio development.

The stakeholder recommendation is:

- ***A structured approach through the knowledge curriculum (modules) and study skill sessions should be introduced to enable students to develop self-reflective skills.***

Capability: Evidence from the literature (Frazer and Greenhaigh, 2001) concludes that capability will be enhanced if a student is given feedback about their performance. This concurs with the feedback from the higher-level personnel interviews, which clearly suggests that a structured approach of knowledge transfer between university and industry has the potential to enhance students' capability sooner. Higher-level personnel see 'theory into practice' as a key emerging idea, which is repeated on a number of occasions. Partnerships between academia and industry can ensure students see the relevance of their degree, they are prepared for work and they see the importance of becoming a professional in the construction industry.

Stakeholder recommendations are:

- ***Continual, high quality feedback to students on their academic and work-based performance must be a regular feature of all built environment courses at Anglia Ruskin University and other HE institutions.***
- ***Routes to professional membership are explained to students during Welcome Week/Induction and reinforced during semester one of the students' first year, so that they enroll as a student member of an appropriate professional body e.g. CIOB.***

Objective 3 – Establish whether WBL can contribute to an academic qualification and whether there is a shortfall in the skills needed in order to prepare students for work.

The research objective enables the researcher to gain a detailed understanding of WBL approaches to education and whether the current undergraduate curriculum in the Department of Engineering and the Built Environment at Anglia Ruskin University is meeting the needs of employers in the construction industry.

Workplace learning: This has the potential to develop higher-level skills, which Dreyfus and Dreyfus (1980) see as essential in moving through the levels from novice to expert. This is identified as a key concept in the conceptual framework and the research has demonstrated the value placed on experience in becoming a professional. The argument for linking theory with practice is well documented (Raelin, 1997) but how that can be best achieved is open to interpretation and continued debate. There is overwhelming support from higher-level personnel for workplace learning to be included in an academic award, emphasising the importance of industry and academia partnerships.

Employability of graduates is the new genre in higher education (HEFCE, 2011). Evidence from the literature (ARU, 2011a) suggests that employability skills could be developed in the workplace through WBL. Pathway leaders at UK universities offering a BSc Construction Management course support reflective practices in WBL. The majority (80%) of pathway leaders indicate that WBL can contribute to an academic award.

The research critically appraises different models of WBL (Burns and Chisholm, 2003; Brown and Harte, 2006; Raelin, 1997) and analyses the model suggested by Raelin (1997) in the context of the characteristics or WBL curriculum identified by Margaryan (2008) and Boud and Solomon (2001). Five key themes emerge from this literature and they should be embedded in a WBL approach to curriculum design. The five key themes, which are supported by

pathway leaders at UK universities offering a BSc Construction Management course, are:

1. *Relevance of the curriculum in meeting student/employer needs using work-based activities to facilitate learning.*
2. *The curriculum needs to be flexible to recognise individual needs through an individual learning plan.*
3. *The learning experience is key to achieving student/employer satisfaction.*
4. *The learners starting point with regard to current competencies should be examined.*
5. *Learning outcomes are important in a WBL course.*

At the heart of the five key themes is engagement with industry and how the curriculum can facilitate this process. This is also an emerging idea from the higher-level personal interviews with workplace assessment identified as an opportunity for further development. A structured approach to WBL reinforces the key message from the literature (Corkill, 2006) that PDP must relate in a meaningful way to WBL and employers must have an input into the WBL experience.

Stakeholder recommendations are:

- ***Ensure the requirements of the Faculty of Science and Technology Work Placement Handbook at Anglia Ruskin University are fully implemented in the proposed new module 'Negotiated Workplace Learning'.***
- ***The five key themes emerging from the literature (Margaryan, 2008; Boud and Solomon, 2001) should be embedded in all built environment courses at Anglia Ruskin University and where applicable, other HE institutions.***
- ***Investigate how workplace assessments can be implemented into the undergraduate curriculum in the Department of Engineering***

and the Built Environment at Anglia Ruskin University and where applicable, other HE institutions.

Shortfall in the skills needed in order to prepare students for work:
Evidence from the literature (ARU, 2011a) identifies the importance placed on the development of employability skills in higher education. Many other sources of evidence exist (QAA, 2012a; 2012b; 2012c; 2008; CIC, 2012; University of Kent, 2011; Edwards, 2009; Higher Education Academy Centre for Education in the Built Environment, 2004) but there is no definitive list of what a student in construction management should be studying in terms of knowledge and understanding as well as the skills and competencies leading to employability.

The perceived gap in skills identified by built environment students at Anglia Ruskin University needs to be addressed and the integrated model of PDP and WBL has the potential to enhance traditional academic theory. The implementation at Anglia Ruskin University of the final 'super suite of employability skills and competencies' provides an opportunity through the integrated model of personal department planning and WBL to address the shortfall in skills in order to enhance the students' academic and employability profile. The evidence (CBI, 2011) indicates the perceived gap in skills is not just an Anglia Ruskin University problem and employers in the construction industry are not entirely satisfied with a graduate's employability skills.

Stakeholder recommendations are:

- ***All undergraduate built environment courses at Anglia Ruskin University should demonstrate engagement with the employability agenda through the development of employability skills and competencies. Other HE institutions should do the same.***
- ***Introduction of study skills to include the preparation of a CV, application form and letter writing with assistance of interview techniques.***

Objective 4 – Explore the importance of academic study and professional training to experienced professionals working at the cutting edge of the construction industry.

This research object follows on from the previous object by considering employer requirements with regard to student employability and their training needs. The conceptual framework shows a clear link between academic study and employment.

Importance of academic study: There is agreement between higher-level personnel and students insomuch as an integrated approach to academic study and WBL enhances the students' employment prospects. Higher-level personnel see it as a base from which to develop theoretical knowledge and be able to apply it in the workplace. Industry sees higher education as playing a key role in the development of the professional and the two to three years after graduation provide an opportunity to mould the professional practice experience of the graduate. The literature (Eraut, 1994) supports this view and education must continue to be seen as being able to increase the knowledge base of professionals. Eraut (1994) is a key text on the study of professional's work and provides a useful critique of professional competence. The thoughts and ideas presented by Eraut (1994, p.163) on the 'Concepts of Competence and their Implications' have provided a useful basis with which to explore professional competence with higher-level personnel.

Higher-level personnel indicate that ethical responsibility is a pre-requisite of becoming a professional. A view supported by the literature (Institute for Learning, 2009) and identified by Swedish undergraduate students as an essential part of undergraduate study (Solbrekke and Karseth, 2006). The integrated model of PDP and WBL includes ethics and ethical issues in the built environment as these areas are not covered in sufficient depth on current construction management and quantity surveying courses at Anglia Ruskin University as identified by final year students.

The stakeholder recommendation is:

- ***Emphasize the importance of becoming a professional and develop the principles of ethics and ethical responsibility in all built environment students.***

Professional training: The research has not established any preference for informal or formal training from the higher-level personnel but did identify if industry and academia are to work together in a more proactive way, industry needs to know more detail about the higher education curriculum. Higher-level personnel see current qualifications as meeting their need but full time students need to have work experience and all students need to develop employability skills and competencies in readiness for Chartered Membership.

The stakeholder recommendation is:

- ***Ensure employers have a full understanding of the built environment curriculum by engaging with them on a regular basis.***

Objective 5 – Propose an integrated model of PDP and WBL to enhance traditional academic theory.

The achievement of the previous four research objectives has provided evidence, which enables the fifth objective to be achieved. This objective provides closure of the research project and allows for informed comment to be made against the research aim. The themes identified in the conceptual framework provide context to the study, which enable the integrated model to be developed.

Integrated model: The model of PDP and WBL showing knowledge and skill activity for the BSc Construction Management course has been produced.

Evidence from two focus groups suggests that the model along with supporting information has the potential to enhance traditional academic theory. The focus groups indicate that the changes made to the BSc Construction Management course at Anglia Ruskin University are forward looking and identify that the integration of employability skills alongside PDP and a structured programme of WBL in the curriculum provide a framework for supporting the development of professional competencies and enhanced capability.

In developing the model, the views of QAA (2012a, 2012b, 2012c; 2008); CIC (2012); Whitlock (2005); Higher Education Academy Centre for Education in the Built Environment (2004); ARU (2011a, 2011b); University of Kent (2011); Cottrill (2010); Edwards (2009); Margaryan (2008); Clegg and Bradley (2006); Corkill (2006); Solbrekke and Karseth (2006); Whitlock (2005); Boud and Solomon (2001); Frazer and Greenhaigh (2001); Cheetham and Chivers (1998); Raelin (1997); Eraut (1994); Schön (1983); Dreyfus and Dreyfus (1980) have been taken on board. The focus groups provide confirmation that the information presented in relation to the final research objective is in the main, appropriate, well presented, easily understood and of value to students, employers and academic colleagues.

The Graduate Skills Framework for Construction Management is an illustration of how the model can be advanced and provides an integrated approach through which students are able to develop and record a broad range of skills and experiences. This has the potential to support the development of the skills and competencies needed for construction management, which would go some way to bridging the gap to Chartered Membership of the CIOB.

Stakeholder recommendations are:

- ***Implement the ideas identified in the integrated model of PDP, WBL and professional skill development including eight new modules.***
- ***Implement the Graduate Skills Framework for Construction***

Management across the Department of Engineering and the Built Environment at Anglia Ruskin University for all new first year students. Other HE institutions should consider implementing the Graduate Skills Framework for Construction Management at their own institution.

- ***The CIOB should consider the how the Graduate Skills Framework for Construction Management could capture the skills and competencies needed for professional membership.***

This research project has examined whether changes to PDP and WBL have a positive effect on the achievement of professional competencies and capability. The implementation of a model showing knowledge and skill activity together with the final 'super suite of employability skills and competencies' provides a framework through which PDP and WBL can be developed.

Achievement of the objectives has demonstrated ***the extent to which the potential academic processes of PDP and WBL, as part of an undergraduate degree, can enhance achievement of professional competencies and capability.*** The aim has been satisfied through the development of an integrated model of PDP and WBL to enhance traditional academic theory. With a Graduate Skills Framework for Construction Management students are able to demonstrate achievement of the skills and competencies to enhance the achievement of professional competence and capability.

8.4 Contribution to knowledge and professional practice

This research is only a small part of a wider and complex web of activity in construction education and professional practice. It is within this context that the original contribution to knowledge and professional practice is identified.

A critical review of published literature on PDP (Clegg and Bradley, 2006;

Corkill, 2006; Edwards, 2005), WBL (Margaryan, 2008; Bould and Solomon, 2001; Raelin, 1997), professional practice (Cheetham, 1999), models of professional competence (Cheetham and Chivers, 1998; Miller, 1990; Dreyfus and Dreyfus, 1980) and reflective practices (Schön, 1983) have enabled the conceptual framework to be developed. Through this framework a gap in knowledge is identified linking the teaching of PDP and WBL with the acquisition of the skills and competencies needed for professional membership.

This research has added to the body of knowledge on PDP by identifying the shortcomings of Clegg and Bradley (2006) and the three different models of PDP practice. In vocational areas such as construction management at Anglia Ruskin University there is a real overlap between the three models, which suggest an integrated academic, employment and professionally focussed model has the potential to enhance current practice. This is verified by senior construction professionals and highlighted as a recommendation for verification through subsequent action research.

The research has contributed to the body of knowledge by extending the work of Edwards (2005) and Corkill (2006) and producing a model for the delivery of PDP and WBL in the built environment that extends to honours degree level. Optimisation of practice at Anglia Ruskin University, and other institutions where WBL, PDP and professional competencies have not been recognised could be achieved by the implementation of the model (Graduate Skills Framework for Construction Management). Through the Graduate Skills Framework for Construction Management the teaching of employability skills alongside a structured programme of PDP and WBL in the curriculum could support the development of professional competencies and enhanced capability across the higher education sector. The introduction of a learning log allows students to record their WBL experience, which is a key driver in putting theory into practice. Reflective practices have been embedded in the model, which support the development of professional competence and capability.

An integrated academic, employment and professionally focused model can enhance current practice at Anglia Ruskin University, thus supporting students'

learning and the acquisition of knowledge. The model is filling this void and contributing to professional practice at the university by showing this as a central theme to the students' studies. Embedding the 'super suite of employability skills and competencies' into the curriculum in a structured manner provides a clear opportunity to enhance the students' academic ability and employment prospects. Given the lack of integration of WBL, PDP and professional competencies evident in the literature, this approach may be generalizable to any institution where the importance of these academic processes has not been recognised.

Boud and Solomon (2001) and Margaryan (2008) have only gone so far with the key characteristics of a WBL curriculum. Embedding the researchers five key themes into a WBL approach to curriculum design demonstrates a contribution to professional practice, which has the potential to enhance engagement with industry thus providing an improved employment focus to the curriculum. The research extends the theoretical work of Raelin (1997) and introduces an application based model of WBL by exploring the link between theory and practice.

Finally, the research demonstrates a 'one size fits all' policy will not work as students have different needs and aspirations. However since no framework exists within Anglia Ruskin University, the model demonstrates a contribution to professional practice through which students can develop higher skills and competencies.

The conclusions drawn from the research have contributed to the body of knowledge by developing and integrating the significance of PDP, workplace learning and professional competence. The development of an integrated model has the potential to enhance professional practice through the achievement of professional competencies and enhanced capability. This could be achieved in any institution where WBL, PDP and professional competencies are not fully embedded in the curriculum.

To be a truly successful model, policy will need to change at the Chartered

Institute of Building (CIOB). Evidence from a students' studies including work experience will need to be recognized as contributing to the evidence required for the CIOB Professional Review. Although, changing policy at a professional body takes a considerable amount of time and energy, there are processes and procedures in place at all professional bodies to 'realize the dream'. The first stage will be for the researcher to discuss the recommendations of the thesis with the CIOB Education Manager with a view to presenting the main ideas in the thesis to the CIOB President, in order to gain support before starting any formal process. As the CIOB (2014b) indicate 'The achievement of professionalism at all levels within the construction industry is at the core of our work'.

8.5 Limitation of the study and recommendations for further work

The research only scratches the surface of an integrated approach to PDP, WBL and professional skill development. The research focuses mainly on the production of a model for one course (BSc Construction Management), however the skills and competencies identified can generally be applied across the built environment sector.

Mixed methods research following a survey-based methodological approach allows data from qualitative and quantitative sources to be obtained. Tackling the research from different angles allows a variety of thoughts and opinions to be captured in the development of an integrated model of PDP and WBL. Unfortunately, the research did not utilize action research so the effect of implementing the integrated model cannot be analysed.

The data collected for the research is obtained from different sources. A comprehensive review of the relevant literature is carried but this could be extended into other areas, such as alternative ways of capturing professional skill development and innovative approaches to WBL delivery.

The questionnaire to final year built environment students produces many quantitative responses. Additional, descriptive responses from students could provide useful qualitative data, such as in-depth feelings and opinions on PDP delivery. The higher-level personnel interviews could be extended to other professions in the built environment sector, such as architects. Finally, the composition of the focus groups could involve support staff from across the University at faculty level and wider in student services, library and the academic office.

The research identifies several areas that are worthy of further investigation, as follows:

As the focus for this research is mainly construction management, future research could consider other professional body information (RICS, RIBA, CIAT, ICE) and include additional skills and competencies in the model for the different professions.

The research could extend the study to include postgraduate students and the additional knowledge, skills and competencies that may be achieved through an MSc Construction Management course.

The research could be extended by undertaking an analysis of practice in construction management at other institutions to establish whether the modular structure of an undergraduate curriculum causes similar issues to those at Anglia Ruskin University in the Department of Engineering and the Built Environment.

A further line of enquiry would be to conduct a longitudinal study following the implementation of the new model and through action research identify whether the changes enhance the achievement of professional competencies and capability.

A comparative analysis could be carried out using a true WBL course e.g. FdSc

Construction Site Management and the revised BSc Construction Management course.

The research identifies reflective practices as an important part of a student's career plan. Further research may consider the extent to which reflective practices could be embedded within a modular curricula structure yet provide a holistic approach to student's study.

Additional research will be useful in evaluating the quality of placement opportunities and the extent active employer engagement has on the student's work experience. This will enable a clear set of criteria to be drawn up on what constitutes a 'successful' placement.

Further research could be carried out on the benefits of a WBL approach for full-time students, which follows a 'thin' sandwich option rather than the proposed model, which has a 'thick' sandwich approach.

Finally, the model could be given to pathway leaders at other UK universities offering a construction management course for their valued opinions.

8.6 Personal reflection

The DProf Built Environment has afforded me the opportunity to engage in research within my professional practice of construction management education. The structured approach of Stage 1 (DProf Built Environment) suited my style of working perfectly. I was able to plan the research around my very heavy workload enabling me to set targets and deadlines which are all achieved. I chose a DProf Built Environment rather than an EdD Doctorate in Education because the research is set within a construction management paradigm and is related to both academic and industrial perspectives. The DProf Built Environment encourages engagement with senior professionals in the built environment thus enabling active learning partnerships with fellow

students. The opportunity to discuss my work with practitioners from industry brought the research material to life; it enhanced the context of my work and saw theory being put into practice, a concept at the heart of my research.

The research covers three interrelated areas: PDP, WBL and professional competence. It is wide ranging and has been undertaken whilst working full-time in the Department of Engineering and the Built Environment at Anglia Ruskin University, the last three years of which have been in an Acting Head of Department capacity. As an 'insider researcher', I care passionately about the students and staff in the department. I want the courses taken by students to be of the highest quality, meeting both their needs, the needs of employers and professional bodies. The research has given me an opportunity to change professional practice, within my own institution and in the future, within the CIOB.

I do not claim that the research has all the answers and the model that I have developed will change all of the perceived shortcomings in construction management education. Given more time, I would have undertaken an in-depth analysis with students following the questionnaire on the perceived gap in skills, as this would have given a greater depth to their responses.

The thesis has opened my eyes and had a profound effect on my relationship with research. I have learnt a great deal about research philosophy and method(ology) but also a lot about myself, the resilience needed to keep on going and the importance of stopping, thinking and reflecting on my work. I hope my own observations will aid others in the pursuit of enhancing current practice in the field of construction management education.

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Appendices **(numbering relates to cross referencing in the main text)**

Appendix 2.1: Further examples of professional bodies in the built environment sector with a Royal Charter

Professional Body	Statement
Royal Institution of Chartered Surveyors (RICS)	The RICS acts in the public interest: setting and regulating the highest standards of competence and integrity among its members; and provides impartial, authoritative advice on key issues for business, society and governments worldwide. *RICS (2010)*
Royal Institute of British Architects (RIBA)	The RIBA champions better buildings, communities and the environment through architecture and our members. The RIBA provide the standards, training, support and recognition that put our members – in the UK and overseas – at the peak of their profession. *RIBA (2012)*
Institution of Civil Engineers (ICE)	The ICE was founded in 1818 by a small group of idealistic young men and was granted a royal charter in 1828. The ICE strives to promote and progress civil engineering and believes that civil engineers are 'at the heart of society, delivering sustainable development through knowledge, skills and professional expertise.' *ICE (2012)*
Chartered Institute of Architectural Technologists (CIAT)	CIAT was recognised by Incorporation by Royal Charter in July 2005. The objects of CIAT are: • to promote, for the benefit of society, the science and practice of Architectural Technology; • to facilitate the development and integration of technology into architecture and the wider construction industry to continually improve standards of service for the benefit of industry and of society; • to uphold and advance the standards of education, competence, practice and conduct of members of the Institute thereby promoting the interests, standing and recognition of Chartered Members within the industry and the wider society. *CIAT (2012)*

Appendix 2.2: Strengths and weakness of formal and informal learning (Source: Margaryan, 2008, pp.14-15)

Formal learning	
Strengths	***Weaknesses***
Content is pre-selected, quality controlled and pre-structured.	Content may become out of date or may not be relevant to particular situations.
A dedicated instructor supports, motivates, guides, manages and monitors the learning process.	Instructors vary in their capability to deal with individual needs and differences of the participants.
The learning process is well defined in terms of time involved; learning takes place in a dedicated space where distractions from ordinary work can be put aside. A tempo and discipline can be planned for in advanced.	The times, places and pace chosen for learning may not fit the needs of individual learners.
Learning involves social interaction and networking with fellow learners.	Social interaction may be forced or superficial and not last after the course is completed.

Informal learning	
Strengths	***Weaknesses***
Learning involves personally authentic experiences and is integrated within real workplace tasks.	Workplace tasks may be repetitive or non-conducive to new learning.
Learning involves direct guidance by workplace peers and experts through modelling, performance monitoring and collaborative learning.	The learner may learn inappropriate or limited knowledge such as short cuts that represent unsafe working practices that encourage exclusiveness and intolerance.
Learning involves observation, listening and access to locally relevant tools and procedures.	There may be a lack of available experts to provide guidance or experts may be reluctant to provide guidance.
Learning is focussed on practice.	The individual may have difficulties in developing understanding in the workplace, leading to uneven conceptual development, ('all procedures, no theory') and disconnected rather than richly associated understanding.

Appendix 4.1: Potential benefits of a WBL programme

(Source: Public Schools of North Carolina, 2013)

Potential benefits for students
Application of classroom learning (both academic and vocational) in a real world setting
Establishment of a clear connection between education and work
Improvement of their post-graduation employment opportunities
Development and practice of positive work related habits and attitudes including the ability to think critically, solve problems, work in teams, and resolve issues that relate to possible careers
Assessment and understanding the expectations of the workplace
Establishment of professional contacts for future employment
Expansion and refinement of their technical skills
Participation in authentic, job related tasks
Potential benefits for employers
Involvement in the curriculum development process
An opportunity to provide community services
A pool of skilled and motivated potential future employees
Reduced training/recruitment costs
Developmental opportunities for a current workforce

Appendix 4.2: COBE's generic course framework for WBL at first year undergraduate level (Source: COBE, 2006)

Block 1 • Describe self, work role and setting • Carry out initial personal skills audit in relation to work role • Identify priority area for improving skills • Explore organisation type and context (including the wider competitive environment) and cognitive skills involved • Negotiate WBL agreement to benefit self and work • Establish learning log system	**Block 3** • Explore regulations, policies and procedures affecting workplace • Identify roles and responsibilities, especially in health and safety • Carry out a risk assessment for an area of work • Evaluate effectiveness of procedures and make suggestions • Produce information for others • Implement strategy for improving own skill in priority area
Block 2 • Explore and evaluate settings' resources: internal/external, physical, information, expertise, training, personal support • Comment on the resources' fitness for purpose/ coverage/efficiency of use • Identify gaps/improvements and produce recommendations with rationale, costs and benefits • Develop strategy for improving priority area of own skills • Contribute to on-line conference on occupational standards	**Block 4** • Review personal/professional knowledge and skills. • Evaluate own learning on module, drawing on learning log • Produce work-based evidence to demonstrate improvement in own skills • Research relevant/emerging developments • Consider how student could contribute to future developments and present ideas to workplace

Appendix 4.3: Graduate Common Learning Outcomes (Source: CIC, 2012)

Personal skills	Technical knowledge	Professional knowledge
1. Select and use effectively the necessary range of appropriate written, oral and presentational skills. 2. Select and use effectively the necessary range of numerical methods for calculating, checking and presenting solutions to problems. 3. Select and apply the necessary range of IT applications for preparing and presenting information. 4. Identify the aims and objectives of research needs and collect, organize, analyse, evaluate data and present findings. 5. Develop, maintain and encourage constructive working relationships, which seek to avoid or resolve conflicts and differences. 6. Work effectively in teams through interpersonal relationships and group dynamics to agree goals, plans, review and evaluate progress. 7. Define, investigate and analyse problems of a non-routine and unfamiliar nature and apply judgment to devise practical and creative solutions. 8. Review and identify own learning needs and resources, undertake personal development and evaluate achievements against targets.	1. The principles of planning, design and development and their application within the sector. 2. The principles of current and innovative procurement processes. 3. Principles and benefits of integrated teams. 4. The significance of clients and user requirements, factors affecting development and design fitness for purpose. 5. The concepts of construction technology. 6. The importance of design information, its development and communication to other parties. 7. The principles of project planning, auditing and monitoring. 8. The models of quality management. 9. The issues associated with project completion and learning from feedback. 10. The principles of the operation, maintenance, management and reuse of property, structures and services.	1. The principles of professional ethics and values across the industry, professional judgment and duty of care. 2. The importance of sustainable development, environmental legislation, energy management and environmental impact. 3. The principles and processes of legal frameworks, contracts, statutory control and the responsibilities and constraints they place on action and interaction. 4. The application of health, safety and welfare legislation and responsibilities, and the processes of hazard identification and risk management. 5. Economic principles and their application and significance to the sector and the principles of management and business operation and commercial risk. 6. Social, political and cultural issues and their implications and significance to design, development and use of the built environment.

Appendix 4.4: Identification of knowledge and understanding, intellectual, practical and transferable skills from undergraduate Built Environment Course Specification Forms (CSFs) at Anglia Ruskin University (alphabetical order)

	Courses						
	Architecture	Architectural Technology	Building Surveying	Civil Engineering	Construction Management	Quantity Surveying	Real Estate Management
Knowledge and Understanding	Communication competencies (graphic and modeling techniques, communication) Cultural competencies (urban design and landscape, built environment) Design competencies (architectural designs, brief development, culture, history and theory, building technology, regulatory frameworks). Environmental and technological competencies (environmental design, construction technology, sustainability, structures, materials, health	Design procedures and practice competencies (develop and test technical design solutions, technical regulatory factors affecting project design, detailed design and production Information, design procedures, design proposals, planning work, organizing information, business and management, professional practice) Procurement and contracts competencies (procurement methods and techniques, procedures for project tenders and bids, contract administration, health and safety) Technological	Built environment Building and condition surveys (residential and commercial buildings). Building pathology Civil, Property and Land Law Construction technology of low rise residential and commercial buildings Conversion and adaptation of buildings Current issues at the forefront of theory and practice Discipline of building surveying Economics Environmental issues Ethical issues	Building processes Building technology Built environment Construction management, contract and surveying Current issues in civil engineering Design, construction and maintenance of engineering infrastructures Design and conduct experimental work for engineering issues Engineering practice and development Health and safety with particular reference to hazard identification and risk prevention Identify, formulate and solve engineering problems Impact of engineering projects and the relevant solutions on both natural environment and human society Mathematics, science and technology used for engineering problems Professional and ethical responsibility Properties and use of construction and building materials Sustainability and resources efficiency Use and development of the codes of practices (Eurocodes and British Standards)	Application of IT Building construction (domestic, industrial and commercial) Built environment Business processes Construction processes Current issues at the forefront of theory and practice Data and information Economics Environmental issues Ethical issues Health and safety Law Materials Role of the construction manager Scientific principles Site and project	Application of IT Building construction (domestic, industrial and commercial) Built environment Business processes Current issues at the forefront of theory and practice Development techniques Economics Environmental issues Ethical issues Health and safety Law and contract Management techniques Principles of quantity surveying and commercial management Professional	Acquisitions and disposal of property Built environment Business processes Civil, Property and Land Law Construction technology of low rise residential and commercial buildings. Current issues at the forefront of theory and practice Discipline of Real Estate Management Economics Environmental issues Ethical issues Health and safety Home Buyers Reports Marketing strategies

	and safety) Professional studies and management competencies (design procedures, social, economic and cultural frameworks)	competencies (design, construction, development, specifications, quality control, performance in use)	Health and safety Home Buyers Reports Scientific principles Sustainability and sustainable construction Valuation principles as affecting the building surveyor Working knowledge of building surveying practice		management Sustainability and sustainable construction	responsibility Sustainability and sustainable construction	Professional responsibility Property development Property investment and management Scientific principles Valuation principles and methodology.
Intellectual (Thinking) Skills	Analyse and evaluate Assimilate, memorise and recall Problem solving Professional awareness	Analyse and evaluate information and synthesize it with the students own design objectives Assimilate, memorise and recall Collect and record data Problem solving Professional awareness	Analyse and evaluate Assimilate, memorise and recall Building pathology techniques Collect and record data Problem solving Professional awareness	Developing and Understanding Research and Innovation Engineering design Ethics Highway deterioration Modelling of engineering problems Problem-solving and analytical skills Research on new solution and new understanding for engineering issues	Analyse and evaluate Assimilate, memorise and recall Collect and record data Problem solving Professional awareness	Analyse and evaluate Assimilate, memorise and recall Problem solving Professional awareness	Collect and record data Problem solving Professional awareness
Practical Skills	Designing Independence and self management Negotiation, leadership and	Independence and self management Negotiation, leadership and management Research and apply	Independence and self management Research Teamwork Undertaking site	Application of theory to practice Civil Engineering Fieldwork Practice Developing and Executing Research Experiment Engineering surveying Independence and self management	Independence and self management Negotiation, leadership and management	Independence and self management Research Teamwork	Independence and self management Research Teamwork Valuations,

	management Research Teamwork	knowledge Teamwork	inspections and recording property defects Use of building surveying equipment	Project Management Teamwork Use of IT systems and software	Planning and scheduling Research Teamwork		property investment and property appraisal techniques Undertaking site inspections and recording property defects Use of building surveying equipment
Transferrable Skills	Communication (spoken, written and graphical) Enquiry and reflective self analysis Information technology and quantitative methods Learning strategies and study techniques	Communication (spoken, written and graphical) Enquiry and reflective self analysis Information technology and quantitative methods Learning strategies and study techniques	Communication (spoken, written and graphical) Enquiry and reflective self analysis Information technology and quantitative methods Learning strategies and study techniques	Appreciation and evaluation of different solutions for the same engineering issues Communication (spoken, written, presentation, discussion and graphical) Creativity General principles and methodology of engineering problem-solving Information technology and quantitative methods	Communication (spoken, written and graphical) Enquiry and reflective self analysis Information technology and quantitative methods Learning strategies and study techniques	Communication (spoken, written and graphical) Enquiry and reflective self analysis Information technology and quantitative methods Learning strategies and study techniques Numerical techniques	Communication (spoken, written and graphical) Enquiry and reflective self analysis Information technology and quantitative methods Learning strategies and study techniques

Appendix 4.5: Mapping of COBE's generic course framework for WBL at first year undergraduate level to the set of enhanced employability skills and competencies for built environment students

COBE's generic course framework	Specific Career Competencies (Based on the CIOB (2014a) PDP and the CIOB (2013b) Professional Review)
Block 1	
• Describe self, work role and setting	• Personal effectiveness at work
• Carry out initial personal skills audit in relation to work role	• Personal effectiveness at work
• Identify priority area for improving skills	• Commitment to CPD
• Explore organisation type and context (including the wider competitive environment) and cognitive skills involved	• Personal effectiveness at work
• Negotiate WBL agreement to benefit self and work	• Personal effectiveness at work
• Establish learning log system	• Planning and organising work
Block 2	
• Explore and evaluate settings' resources: internal/external, physical, information, expertise, training, personal support	• Personal effectiveness at work
• Comment on the resources' fitness for purpose/ coverage/efficiency of use	• Professional judgement and responsibility
• Identify gaps/improvements and produce recommendations with rationale, costs and benefits	• Leadership and strategic/financial management
• Develop strategy for improving priority area of own skills	• Commitment to CPD
• Contribute to on-line conference on occupational standards	• Communication
Block 3	
• Explore regulations, policies and procedures affecting workplace	• Knowledge of commercial, contractual and legal issues
• Identify roles and responsibilities, especially in health and safety	• Managing health and safety
• Carry out a risk assessment for an area of work	• Managing health and safety
• Evaluate effectiveness of procedures and make suggestions	• Decision making
• Produce information for others	• Managing information
• Implement strategy for improving own skill in priority area	• Personal effectiveness at work
Block 4	
• Review personal/professional knowledge and skills.	• Commitment to CPD
• Evaluate own learning on module, drawing on learning log	• Personal effectiveness at work
• Produce work-based evidence to demonstrate improvement in own skills	• Communication
• Research relevant/emerging developments	• Communication
• Consider how student could contribute to future developments and present ideas to workplace	• Communication

Appendix 5.1: Three PDP models identified by Clegg and Bradley (2006)

PDP model	Main features of the model	Implementation of the model
Professional	PDP included physical evidence (portfolio), which was matched to the various professions and the student's overall personal development. A specific professional skills module. In some cases, this was taught through an inter-disciplinary module. Reflection and reflective practice is a key feature of this model with reflection on subject knowledge, process and personal attributes (seen as being key).	Students need to record, reflect and plan their personal progress and development through a progress file. Students develop a specific set of competencies required for a predetermined career path on graduation.
Employment	This model was found in courses, which do not lead to specific professional careers e.g. business studies. Within the model two distinct sub-groups emerged: Job rich – focus is on longer-term career management and employability, which developed a holistic view of experience and personal development. Placement – concentrating on the shorter-term need of students through recognition of the transferable skills and experience students may gain during part-time and voluntary work.	Students need to produce a CV, application form and accompanying letter. Students undertake a skills audit. This is delivered within a skills related module.
Academic	Emphasis on academic development, meta cognitive skills and subject discipline specific skills with the emphasis of progression from school lever/novice student to independent learner. Skills development focuses on those, which are relevant to the degree/discipline e.g. basic grammar and literacy towards the higher-level skills of academic reasoning and vocabulary of the subject. Students develop an understanding of the process of learning, the development of thinking skills, which underpin learning. Students need to recognise own learning processes and to capture these through reflection. The model focuses on the academic development of the students and the skills needed to fulfil the academic needs of the subject discipline.	Students develop their essay writing, report writing and presentation skills. Students undertake study skills to ensure their own academic development.

Appendix 6.1: Summary of the population and sample size required for the questionnaires

Questionnaire	Population	Sample required (Based on the criteria specified by Bartlett, Kotrlik and Higgins, 2001)
How students learn and apply knowledge	314	143
Personal development planning and skill development (based on information on the CSFs)	323	148
Contribution work-based learning can make to the curriculum	35	21
Draft super suite of employability skills and competencies	141	46
Additional questionnaire following the mid semester review, what students learnt	44	25

Appendix 6.2: Questionnaire to Built Environment Final Year Students

Course: ……..

Which mode of study? Full time Part time

How many years have you studied on your course at ARU? 1 2 3 4 5 6

Qu. 1 There are numerous ways in which students learn. Rate each of the statements below, out of 5, on the ways in which you learn (1 being not important to 5 being really important).

Ways of learning	***1 to 5***
Reading	
Thinking	
Observing	
Question and answer	
Browsing	
Doing	
Reflecting	
Role play	

Qu. 2 Which environment do you learn best in? From the list below, please tick those that apply to you.

Learning environment	***Not important***	***Important***	***Very important***
Lecture			
Seminar			
Tutorial			
Workshop			
Practical session			
Physical library			
Digital library			
Internet			
Through work			
Virtual Learning Environment			

Qu. 3 During formal sessions such as lectures, do the tutors generally:

Learning environment	***Yes***	***No***	***Sometimes***
Outline the lecture			
Structure the lecture			
Provide a summary of the key points at the end of the lecture			

Qu. 4 On your course, how often are you encouraged to reflect on previous learning?

Never	***Sometimes***	***Often***	***Always***

Qu. 5 To what extent do you relate to the following definitions of learning? Please tick the three most important to you.

Definitions of learning	***Tick***
A change in behaviour as a result of experience or practice	
A process, by which behaviour is changed, shaped or controlled	
The individual process of constructing understanding based on experience from a wide range of sources	
Learning is the lifelong process of transforming information and experience into knowledge, skills, behaviours and attitudes	
Learning is both a cognitive and a behavioural process	

Qu. 6 The theme of the definitions in Qu. 5 relates to a change of behaviour. Do you feel a change of behaviour results from experience?

Yes No

Qu. 7 Do you feel that instinct rather than experience determines behaviour?

Yes No

Qu. 8 Please provide *your* definition of learning in the box below.

Qu. 9 How key to your learning are the following themes?

Theme	***Not key*** → ***Very key***				
Importance of structure and sequencing of material					
Readiness for learning (the curriculum should revisit topics on a regular basis)					
Intuitive and analytical thinking (being given the opportunity to answer a problem without fear of ridicule)					
Motives for learning (arousal of interest to engage students)					

Qu. 10 During your course are you able to?

Activity	***Yes or No***
Make changes to an activity as it is happening (Reflection-in-action	
Review events after they have occurred (Reflection-on-action)	

Qu. 11 To what extent is professional practice emphasised during your course?

Never	***Occasionally***	***Often***	***Always***

Qu. 12 Rate of each of the statements below, out of 5, on why you want to learn (1 being not important to 5 being really important)

Statement	**1 to 5**
To get a good job	
The skills and knowledge will be useful for my chosen career	
To study the subject in depth	
University was the obvious progression from my previous study	
Learning will help me develop as a person	
Learning will broaden my horizons	
It will give me a chance to prove what I can do	
Study will improve my confidence and independence	
To become a professional	
To make a contribution to society	

Qu. 13 At university, do you feel that the three types of knowledge identified below are adequately developed in your studies?

Type of knowledge	***Yes***	***No***	***Not sure***
Propositional (theory and concepts)			
Personal (able to reflect on my own experiences)			
Process (linking theory and practice together)			

Qu. 14 How well do you relate knowledge from one subject (module) to another?

Not at all →				***Very well***

Qu. 15 Does your course enable you to apply theoretical knowledge to practical situations?

Not at all →				***Very well***

Appendix 6.3: Questionnaire to Built Environment Final Year Students (Construction Management Version)

Indicate your mode of study? Full time Part time

How many years have you studied on your course at ARU? 1 2 3 4 5 6

Qu. 1 The list below, which is taken from the Construction Management Course Specification Form (CSF) at Anglia Ruskin University and approved by Course Leaders, identifies the knowledge and understanding, intellectual, practical and transferable skills that should be covered on your course. Rate the coverage of each of the skills sets out of 5 (1 not covered to 5 definitely covered).

Area	Skills set	1 to 5
Knowledge and understanding	Application of IT	
	Building construction (domestic, industrial and commercial)	
	Built environment	
	Business processes	
	Construction processes	
	Current issues at the forefront of theory and practice	
	Data and information	
	Economics	
	Environmental issues	
	Ethical issues	
	Health and safety	
	Law	
	Materials	
	Role of the construction manager	
	Scientific principles related to construction	
	Site and project management	
	Sustainability and sustainable construction	
Intellectual (Thinking) Skills	Analyse and evaluate	
	Assimilate, memorise and recall	
	Collect and record data	
	Problem solving	
	Professional awareness	
Practical Skills	Independence and self management	
	Negotiation, leadership and management	
	Planning and scheduling	
	Research	
	Teamwork	
Transferrable Skills	Communication (spoken, written and graphical)	
	Enquiry and reflective self analysis	
	Information technology and quantitative methods	
	Learning strategies and study techniques	

Qu. 2 How would you define the term Personal Development Planning (PDP)?

……

……

……

……

Qu. 3 On a scale of 1 to 5 (1 being definitely 'no' to 5 being definitely 'yes'), should students studying an academic qualification cover:

Statement	**1 to 5**
Employability skills	
PDP	

Qu. 4 Have you ever covered Employability skills during your time at Anglia Ruskin University?

Yes **No** **Do not know**

Qu. 5 Have you ever covered PDP activities during your time at Anglia Ruskin University?

Yes **No** **Do not know**

Qu. 6 **Do you feel the following areas of career (employability), academic and personal skill development would be/have been helpful to you on your course?**

***Area* of career (employability), academic and personal skill development**	***Would be helpful***	***Have been helpful***
Interpersonal skills (interacting with people, listening, developing working relationships)		
Self management skills (time management, objective setting, reflection)		
Learning (study) skills (note taking, revision plans, effective reading)		
Written communication skills (report writing, essays, argument construction)		
Verbal communication skills (presentations, facilitate group discussions)		
Problem solving skills (analyse information, identify solutions)		
Career management skills (applications, CVs, interview techniques)		
Information and communication technology skills (use of software applications)		
Number and data skills (use of a calculator, perform basic arithmetic operations, analyse data, statistical analysis, develop mathematical arguments)		
Entrepreneurial and business skills (commercial awareness)		

Qu. 7 **The benefits of PDP can be linked to improvements in academic performance, career and professional life, and personal life (Cottrell, 2010). Please tick only the statements, which you feel offer potential benefits.**

	Please tick (one only)
Academic Performance	
A clearer focus for my academic work	
More control over personal motivation and the ability to direct this to achieve my goals	
Skills in self management	
Greater independence and confidence through gaining a better understanding of how to improve my performance	
More enjoyment and less stress from my academic studies as I become consciously skilled	
Greater awareness of how to apply what I have learnt to new problems and contexts	
Reflective, strategic, analytical and creative thinking skills that strengthen academic performance	
Career and professional life	
Strategies for improving personal performance	
A better sense of the life and work I want	
More confidence in the choices I make	
Confidence in the skills, qualities and attributes I bring to the career of my choice	
Being in a better position to compete for jobs and to discuss my skills and competences with employers	
The positive attitudes, creative thinking, and problem-solving approaches associated with successful professional life	
Personal life	
Gaining a better understanding of myself and how I tick	
Being in a better position to make appropriate choices to meet my aspirations	
Gaining a better sense of myself as an individual	
Greater awareness of my needs and how to meet them	
Developing a positive, forward-looking approach	
Developing skills such as reflection, strategic thinking, self direction and self-evaluation, useful in most life contexts	

Qu. 8 Which of the following models of PDP delivery would benefit you the most?

Model	***PDP delivery***	***Please tick (one only)***
A	Embedded skills and extra-modular tutorial support. Within this model skills and employability are embedded within the subject specific modules.	
B	Embedded skills, stand-a-lone PDP module and extra-modular support. PDP is delivered formally, usually by a single course module, normally in year 1 (level 4) of the course.	
C	Embedded skills with multi-level PDP modules. PDP is delivered, assessed and supported entirely within the course using stand-a-lone modules at each level (level 4, 5 and 6).	

Qu. 9 Do you agree that a structured programme of PDP and professional skill development is likely to enhance capability?

Yes No Do not know

Qu. 10 Do you agree that 'instinct rather than experience determines behaviour' (Klein, 2009)?

Yes No

Qu. 11 Do you agree that 'Learning requires interaction, either directly or symbolically, with elements outside the learner' (Cohen and Walker, 1993)?

Yes No

Qu. 12 What is meant by ethics and professional responsibility?

……

……

……

……

Appendix 6.4: Questionnaire to Course Leaders at other UK Universities

Qu. 1 Do you have full time undergraduate students

Yes **No**

If the answer is ***Yes***, go to Qu. 2. If not, go to Qu. 4.

Qu. 2 Do the full time undergraduate students undertake work-based learning (WBL) as part of their academic studies?

Yes **No**

If the answer is ***Yes***, go to Qu. 3. If not, go to Qu. 4.

Qu. 3 Does WBL count towards the students' qualification?

a) As a number of specified credits

Yes **No**

b) As a Pass/Fail element

Yes **No**

Qu. 4 Do you have part time undergraduate students?

Yes **No**

If the answer is ***Yes***, go to Qu. 5. If not, go to Qu. 7.

Qu. 5 Are the part time undergraduate students able to use their work experience towards their academic studies?

Yes **No**

If the answer is ***Yes***, go to Qu. 6. If not, go to Qu. 7.

Qu. 6 Does WBL count towards the students' qualification?

a) As a number of specified credits

Yes **No**

b) As a Pass/Fail element

Yes **No**

Qu. 7 Do you feel WBL can contribute towards an academic qualification?

Yes **No**

If the answer is ***Yes***, in what way? Please specify below.

……..

……..

……..

Qu. 8 On a scale of 1 to 5 (1 little importance to 5 extremely important), note the importance of reflective practices in WBL to substantiate theory.

1 2 3 4 5

Qu. 9 The following themes may be present in the design of a WBL curriculum. On a scale of 1 to 5 (1 totally disagree to 5 totally agree), what is your opinion of the factors below?

Statement	**1 to 5**
Relevance of the curriculum in meeting student/employer needs using work-based activities to facilitate learning is important	
The curriculum needs to be flexible to recognise individual needs through an individual learning plan	
The learning experience is key to achieving student/employer satisfaction	
The learners starting point with regard to current competencies should be examined	
Learning outcomes are important in a WBL course	

Qu. 10 **The following list states the benefits of a WBL programme for students. On a scale of 1 to 5 (1 totally disagree to 5 totally agree), what is your opinion of the benefits?**

Statement	**1 to 5**
Application of classroom learning (both academic and vocational) in real world setting	
Establishment of a clear connection between education and work	
Improvement of their post-graduation employment opportunities	
Development and practice of positive work related habits and attitudes including the ability to think critically, solve problems, work in teams, and resolve issues that relate to possible careers	
Assessment and understanding the expectations of the workplace	
Establishment of professional contacts for future employment	
Expansion and refinement of their technical skills	
Participation in authentic, job related tasks	

Qu. 11 ***The following list states the benefits of a WBL programme for employers. On a scale of 1 to 5 (1 totally disagree to 5 totally agree), what is your opinion of the benefits?***

Statement	**1 to 5**
Involvement in the curriculum development process	
An opportunity to provide community services	
A pool of skilled and motivated potential future employees	
Reduced training/recruitment costs	
Developmental opportunities for a current workforce	

Appendix 6.5: Questionnaire to Construction Management Students

Indicate your mode of study Full time Part time

With reference to the list of **Super suite of employability skills and competencies (Update draft)** below, please reflect on the list and put a cross against those that you feel are not applicable to construction management students. In addition, add any others you feel are missing from the list.

Technical and Professional Knowledge (Subject Specific)	**N/A**
1. Built environment	
2. Business management	
3. Contracts (administration and law)	
4. Construction related computer applications	
5. Construction technology	
6. Data and information management	
7. Disputes	
8. Economics	
9. Entrepreneurial and business skills (commercial awareness)	
10. Financial management	
11. Health and safety	
12. Law	
13. Leadership	
14. Management	
15. Measurement	
16. Monitoring and controlling	
17. Negotiation	
18. Planning and organising	
19. Procurement	
20. Scientific principles related to construction	
21. Strategic management	
22. Surveying	
23. Sustainability	
24. ***Other (Please state)***	

Graduate Skills (Academic and Employment)	**N/A**
1. Analysis	
2. Assimilate, memorise and recall	
3. Communication	
4. Data handling	
5. Decision making	
6. Developing and executing research	
7. Improving ones own performance	
8. Inter-personal skills	
9. IT literate	
10. Judgements	
11. Learning strategies and study techniques	
12. Literacy skills	
13. Numeracy skills	
14. Problem solving	
15. Quantitative methods	
16. Questioning	
17. Teamwork	
18. Time management	
19. Working with others (groups)	
20. Other (Please state)	

Specific Career Competencies (Based on the CIOB Professional Development Programme and the CIOB Professional Review)	**N/A**
1. Commitment to code of ethics	
2. Commitment to CPD	
3. Communication	
4. Decision making	
5. Developing people or teams	
6. Implementing sustainable construction and development	
7. Innovation	
8. Knowledge of commercial, contractual and legal issues	
9. Leadership and strategic/ financial management	
10. Managing information	
11. Managing health and safety	
12. Managing quality	
13. Personal effectiveness at work	
14. Planning and organising work	
15. Professional judgement and responsibility	
16. ***Other (Please state)***	

Personal Attitudes and Attributes (Expectations of a Professional)	**N/A**
1. Adaptability	
2. Assertiveness	
3. Attention to detail	
4. Autonomy	
5. Can do approach	
6. Common-sense	
7. Creative and imaginative thinking	
8. Decisiveness	
9. Forward thinking	
10. Initiative	
11. Integrity	
12. Intuition	
13. Open-mindedness	
14. Positive attitude	
15. Presentable	
16. Professional	
17. Reflectiveness	
18. Respect	
19. Responsibility	
20. Self-motivation	
21. Sensitivity	
22. Visionary	
23. ***Other (Please state)***	

Appendix 6.6: Mid Semester Review Supplementary Questionnaire

Indicate your course	Architecture	Architectural Technology
	Building Surveying	Civil Engineering
	Construction Management	Quantity Surveying
	Real Estate Management	

Indicate your mode of study	Full time			Part time		
Indicate your year of study	**1**	2	3	4	5	6

Qu. 1 What knowledge have you learnt in the modules you have studied this semester?

……

……

……

……

……

Qu. 2 What skills have you developed in the modules you have studied this semester?

……

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Appendix 6.7: Preliminary Study

Structured interview questions to higher-level personnel

Background

Existing theory suggests that academic study and subsequent professional training leads to competence and professional membership. This research will aim to modify this existing theory by challenging the inadequacies of purely academic education. The proposal suggests that the inclusion of a selected programme of Personal Development Planning (PDP) and work-based learning (WBL) will lead to earlier or enhanced levels of professional capability.

Five higher level personnel within the construction industry will be interviewed. The interviews will provide valuable data, which can be used to answer the main research question, which is:

> ***To what extent can PDP and WBL, as part of an undergraduate degree, enhance achievement of professional competencies and professional capability?***

The interviews will aim to explore if higher level personnel had studied a structured programme of PDP, professional skill development and WBL, as part of an academic award, would they have achieved their current position quicker and be more capable at their job.

The interviews will explore the extent to which academic study is important to these personnel. The interviews will identify the type of professional training that is preferred and applied in the workplace.

Questions

The questions are grouped into four key areas:

- Background information
- Importance of academic study and professional training
- Competence, capability and professional status
- PDP, professional skill development and WBL

Section A – Background information

1. What are your current job role, nature of the business of the company and number of employees /size of the company?

2. What is your background (education and experience)?

3. What professional training[1] have you had?

4. How did your degree course contribute (formally or informally) to professional training (if applicable)?

5. How long have you been involved at a higher-level personnel function?

6. Would you describe yourself as a professional and if so, why?

7. How would you define the work of a professional?

[1] *Professional training refers to skills and knowledge attained for both personal development and career advancement.*

Section B – Importance of academic study and professional training

1. Is academic study important to you and if so, why?

2. Should professionals be required to have an academic qualification e.g. degree and/or a professional qualification in order to practice as a professional?

3. Do you feel that current academic qualifications meet the needs of becoming a professional?

4. On a scale of 1 – 5 (1 not important, 5 extremely important), should students studying an academic qualification such as an honours degree in construction management cover employability skills[2] and PDP[3]?

5. Should all academic courses in built environment subjects have a work-based element?

6. What type of professional training is preferred – informal/formal[4]?

[2] Employability skills refer to *the set of basic/generic skills and attitudinal/behavioural characteristics that are believed to be essential for individuals to secure and sustain employment, and also to progress in the workplace*' (UKCES, 2010, p.3)

[3] *PDP structured and supported process undertaken by a learner to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development (QAA, 2009).*

[4] *Formal professional training would be associated with an education course at college or university. An informal setting would be linked to the workplace and would centre on the*

individuals social group and their interaction with work colleagues (Crabtree, DProf Thesis, 2012).

7. How can this training be applied in the workplace?

8. What skills and knowledge sets are important in the field of construction management?

Section C – Competence, capability and professional status

1. How would you define the terms competence or competent?

2. Do you think the term competence refers to a person's specific or general competence?

3. Should a competent person be able to perform across a range of specific duties rather than one thing?

4. In today's rapidly changing world, is it enough for professionals to only be competent in a limited range of competencies?

5. What is your view on competency based qualifications e.g. NVQs?

6. Should competency profiles be used in the appointment of higher-level managers?

7. How would you define the term 'capability' and what makes someone capable?

8. To what extent are 'concrete experiences[5]' important in achieving higher levels of performance?

9. With reference to the list of attributes given below, which ***five*** do you feel are the most important to the role of a professional (tick those that apply)?

    - *'Professionals turn out unstandardized products and services*
    - *Professionals are well-versed in an expulsive body of theoretical knowledge and, at times, technique.*
    - *Professionals share a strong sense of identity with their colleagues, from whom they develop a sense of community, a sense of being members of an in-group.*
    - *Professions master a general cultural tradition associated with their line of work.*

- *Professions use institutionalized means of formally or consensually validating the adequacy of training and the competency of trained individuals.*
- *Professional work constitutes a calling, which the primary concerns are consistent application of a standard and provision of a service or product and the actual monetary return is secondary to the work itself.*
- *Professionals are recognized by their clients or publics for their special authority, based on knowledge; experience, in some cases, technique.*
- *Professional services and products provide an avenue for attainment of certain important social values.*
- *Professional work is self-regulated and autonomous'*

[5] *Concrete experiences refer to specific examples that have occurred*

Section D – PDP, professional skill development and WBL

1. How would you define the term PDP?

2. 'Employability' is considered by some in higher education to be the buzz word. What employability skills need to be taught as part of an undergraduate degree?

3. Do you feel that academic study should link more closely with the workplace?

4. Should a period of WBL be part of an academic award and if so, what should students get out of the workplace?

5. Are all workplaces a suitable environment for learning?

6. How can a student's capability happen sooner or be enhanced on an undergraduate degree?

Appendix 6.8: Subsequent Study

Background

Existing theory suggests that academic study and subsequent professional training leads to competence and professional membership. This research will aim to modify this existing theory by challenging the inadequacies of purely academic education. The proposal suggests that the inclusion of a selected programme of Personal Development Planning (PDP) and work-based learning (WBL) will lead to earlier or enhanced levels of professional capability.

Higher level personnel within the construction industry will be interviewed. The interviews will provide valuable data, which can be used to answer the main research question, which is:

> ***To what extent can PDP and WBL, as part of an undergraduate degree, enhance achievement of professional competencies and professional capability?***

The interviews will aim to explore if higher level personnel had studied a structured programme of PDP, professional skill development and WBL, as part of an academic award, would they have achieved their current position quicker and be more capable at their job.

The interviews will explore the extent to which academic study is important to these personnel and identify the type of professional training that is preferred and applied in the workplace. Respondent's views on two models of professional competence will be obtained and the importanace of an enhanced set employability skills and competencies will be considered.

Questions

The questions are grouped into three key areas:

- Background information
- Importance of academic study, PDP, professional skill development and WBL
- Competence, capability and professional status

Section A – Background information

1. What is your current job role, nature of the business of the company and number of employees /size of the company?

2. What is your background (education and experience)?

3. What professional training[1] have you had?

[1] *Professional training refers to skills and knowledge attained for both personal development and career advancement.*

4. How did your degree course contribute (formally or informally) to professional training (if applicable)?

5. How long have you been involved at a higher-level personnel function?

6. Would you describe yourself as a professional and if so, why?

Section B – Importance of academic study, PDP, professional skill development and WBL.

1. Is academic study important to you and if so, why?

2. Should professionals be required to have an academic qualification e.g. degree and/or a professional qualification in order to practice as a professional?

3. Do you feel that current academic qualifications meet the needs of becoming a professional?

4. How would you define the term PDP?

5. On a scale of 1 – 5 (1 not important, 5 extremely important), should students studying an academic qualification such as an honours degree in construction management cover employability skills[2] and PDP[3]? Please provide a rationale for your answer.

[2] Employability skills refer to '*the set of basic/generic skills and attitudinal/behavioural characteristics that are believed to be essential for individuals to secure and sustain employment, and also to progress in the workplace*' (UKCES, 2010, p.3).

[3] *PDP is a structured and supported process undertaken by a learner to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development (QAA, 2009).*

6. Should a period of WBL be part of an academic award and if so, what should students get out of the workplace?

7. Are all workplaces a suitable environment for learning?

8. What type of professional training is preferred – informal/formal[4]?

[4] Formal professional training would be associated with an education course at college or university. An informal setting would be linked to the workplace and would centre on the individuals social group and their interaction with work colleagues (Crabtree, DProf Thesis, 2012).

9. How can this training be applied in the workplace?

10. Do you feel that academic study should link more closely with the workplace and if so, how should industry be involved in academic qualifications?

Section C – Competence, capability and professional status

1. How would you define the terms 'competence' or 'competent'?

2. Do you think the term competence refers to a person's specific or general competence?

3. Should a competent person be able to perform across a range of specific duties rather than one thing and is it enough for professionals to only be competent in a limited range of competencies?

4. What is your view on competency based qualifications e.g. NVQs?

5. Should competency profiles be used in the appointment of higher-level managers?

6. How would you define the term 'capability' and what makes someone capable?

7. To what extent are 'concrete experiences[5] important in achieving higher levels of performance?

[5] Concrete experiences refer to specific examples that have occurred

8. How would you define the work of a professional?

9. On a scale of 1 – 5 (1 not important, 5 extremely important), should a professional be:

    a) competent

    b) act in an ethical way

    c) put the client first

    d) act in the best interest of society?

10. With reference to the list of attributes, which ***five*** do you feel are the most important to the role of a professional (tick those that apply)?

- *'Professionals turn out unstandardized products and services*
- *Professionals are well-versed in an expulsive body of theoretical knowledge and, at times, technique.*
- *Professionals share a strong sense of identity with their colleagues, from whom they develop a sense of community, a sense of being members of an in-group.*
- *Professions master a general cultural tradition associated with their line of work.*
- *Professions use institutionalized means of formally or consensually validating the adequacy of training and the competency of trained individuals.*
- *Professional work constitutes a calling, which the primary concerns are consistent application of a standard and provision of a service or product and the actual monetary return is secondary to the work itself.*
- *Professionals are recognized by their clients or publics for their special authority, based on knowledge; experience, in some cases, technique.*
- *Professional services and products provide an avenue for attainment of certain important social values.*
- *Professional work is self-regulated and autonomous'*

11. Miller (1990) produced a model for assessing clinical competence. The model indicates that the higher up the pyramid an individual goes the greater is the individual's knowledge and their ability to apply that knowledge.

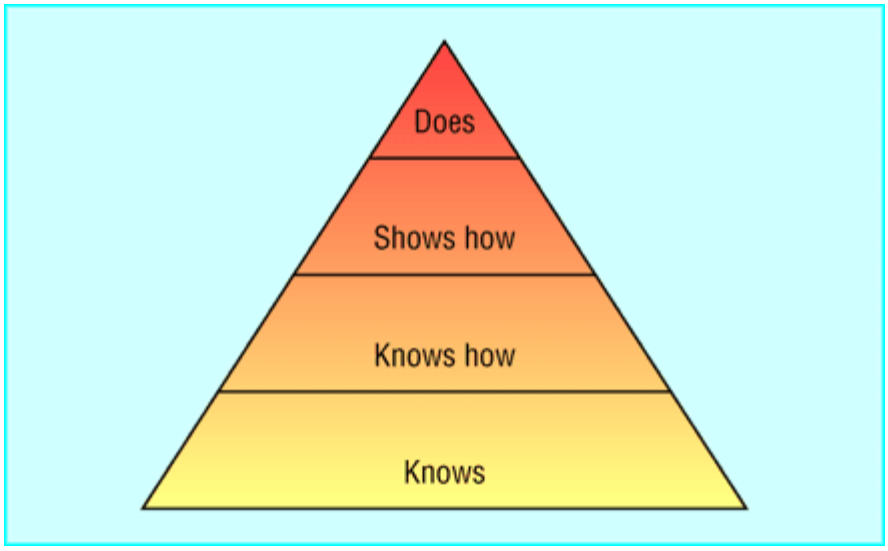


Figure 1 Miller's Pyramid for assessing clinical competence

The pyramid shows a development sequence of stages identifying factual knowledge, application of knowledge and demonstration of skills at the first three levels, all of which could be carried out in an academic setting whereas the top level "does" is predominately occurring in the workplace. "Knows" and "Knows How" are the basic cognition elements of competence and "Shows How" and "Does" are the behaviour elements.

a) Do you agree with Miller's pyramid?

b) Does the model provide a distinction between competence and performance?

c) Do you feel the model can be applied to construction management and if so, why?

12. Cheetham and Chivers (1998) identified that there are four core components of professional competence. On a scale of 1 – 5 (1 not important, 5 extremely important), rate the importance of each core component and sub-component.

Component/Sub-component	**Rating**
Knowledge/Cognitive competence	
• Technical	
• Practical	
• Procedural	
• Contextual	
• Application	
Functional competence	
• Occupation specific	
• Process/organization/management	
• Mental	
• Physical	
Personal/Behavioural competence	
• Social/vocational	
• Inter-professional	
Values/ethics competence	
• Personal	
• Professional	

13. With reference to the list of 'Enhanced employability skills and competencies' (list given to the interviewee), put a cross against those that you feel are not applicable to built environment students. In addition, add any others you feel are missing from the list.

Technical and Professional Knowledge (Subject Specific)	***N/A***	***Graduate Skills (Academic and Employment)***	***N/A***	***Specific Career Competencies (Based on the CIOB Professional Development Programme and the CIOB Professional Review)***	***N/A***	***Personal Attitudes and Attributes (Expectations of a Professional)***	***N/A***
Built environment		Analysis		Commitment to code of ethics		Adaptability	
Business management		Communication		Commitment to CPD		Autonomy	
Contract administration		Decision making		Communication		Common-sense	
Construction related computer applications		Improving ones own performance		Decision making		Decisiveness	
Construction technology		Inter-personal skills		Developing people or teams		Forward thinking	
Disputes		IT literate		Implementing sustainable construction and development		Imaginative	
Financial management		Judgments		Innovation		Initiative	
Information management		Literacy skills		Knowledge of commercial, contractual and legal issues		Integrity	
Law		Numeracy skills		Leadership and strategic/financial management		Intuition	

Technical and Professional Knowledge (Subject Specific)	***N/A***	***Graduate Skills (Study and Employment)***	***N/A***	***Specific Career Competencies (Based on the CIOB Professional Development Programme and the CIOB Professional Review)***	***N/A***	***Personal Attitudes and Attributes (Expectations of a Professional)***	***N/A***
Leadership		Problem solving		Managing information		Presentable	
Management		Questioning		Managing health and safety		Reflectiveness	
Monitoring and controlling		Teamwork		Managing quality		Respect	
Planning and organising		Time management		Personal effectiveness at work		Responsibility	
Procurement		Working with others		Planning and organising work		Self-motivation	
Strategic management				Professional judgment and responsibility		Sensitivity	
Surveying						Visionary	
Sustainability							
Additional items							

14. How can a student's capability happen sooner or be enhanced on an undergraduate degree?

Appendix 6.9: Focus Group Brief

Outline of the meeting

The meeting will last between one and two hours and will take place as a small group of between 6 – 10 participants.

Evidence from the research literature [professional competence, the process of learning and the acquisition of knowledge, work-based learning (WBL) and Personal Development Planning (PDP)] and extensive data collection through questionnaires and structured interviews has established a set of criteria, which has been used to produce a model for integrating PDP and WBL to enhance traditional academic theory.

The focus group will be invited to provide feedback on the following information, which has been produced as an outcome of the above research.

1. Final super suite of employability skills and competencies

Do the participants agree with four areas and content of each area?

- Technical and Professional Knowledge (Subject Specific)
- Graduate Skills (Academic and Employment)
- Specific Career Competencies (Based on the CIOB Professional Development Programme and Professional Review)
- Professional Attitudes and Attributes (Expectations of a Professional)

2. Course structure diagrams

Do the participants agree with the proposed new structure of the construction management course?

- Module titles
- Year/semester of modules in the course
- Thematic content running through the course

3. Model of knowledge and skill activity

Do the participants agree with the model? Will it work for both full and part time students? What would a student, and academic member of staff and an employer expect from the learning log?

4. Skills and competencies matrix

Do the participants agree with the information presented? Should there be greater/less skill/competency coverage? What evidence could be used to demonstrate coverage of the attitudes and attributes?

5. Links between the modules

Do the participants have any observations regarding the links that exist between the modules?

6. Module Definition Forms (MDFs) for the eight new modules

Do the participants have any comments regarding the eight new modules? Are the titles correct? What about the learning outcomes and outline content? Any thoughts on the assessment opportunities? Are the learning resources suitable?

7. Mapping of modules to the CIOB Education Framework

Do the participants have any comments regarding the mapping of the modules to the seven themes within the CIOB Education Framework?

Feedback

Feedback will take place by discussing the questions in each of the seven areas and writing down using a bulleted list, no more than ***five*** comments for each area. The ***single*** biggest issue related to each of the seven points, will then be identified by the focus group. Finally, the focus group will be asked the following question:

Would the implementation of the model of knowledge and skill activity and revised curriculum narrow the gap to professional membership of the Chartered Institute of Building (CIOB)?

Appendix 6.10: Example of Participant Information Sheet and Consent Form

Focus group meetings of current built environment students and staff at Anglia Ruskin University, former built environment students at Anglia Ruskin University, and higher-level personnel specific to construction management

Section A: The Research Project

1. Title of project:

The links between professional competence, professional capability and academic processes.

2. **Purpose**:

Existing theory suggests that academic study and subsequent professional training leads to competence and professional membership. This research will aim to modify this existing theory by challenging the inadequacies of purely academic education. The proposal suggests that the inclusion of a selected programme of Personal Development Planning (PDP) and work based learning (WBL) will lead to earlier or enhanced levels of professional capability.

3. **Invitation to participate**:

As a student or member of staff at Anglia Ruskin University you are invited to contribute to this study by providing detailed feedback on the design and production of an integrated model of PDP and WBL.

4. **Who is organising the research**:

Peter Crabtree is completing this research as part of an award of Professional Doctorate in the Built Environment, Faculty of Science and Technology, Anglia Ruskin University.

5. **What will happen to the results of the study**:

The detailed feedback provided will be used to produce a model, which will be used to enhance traditional academic theory towards an academic award. The results will be published in my final thesis, conference papers and journal articles.

6. **Source of funding for the research**:

The research is funded by the Faculty of Science and Technology.

7. **Contact for further information**:

I can be contacted by email: Peter Crabtree. I can be contacted by email: peter.crabtree@student.anglia.ac.uk and/or by Tel: 0845 196 3958

Section B: Your Participation in the Research Project

1. **Why have you been invited to take part?**

You have been invited to take part because it is felt that you may have experience of construction management education either as a student or member of staff at Anglia Ruskin.

2. **Can you refuse to take part?**

There is no obligation to take part.

3. **Can you withdraw at any time, and how?**

You are free to withdraw at any time but responses will only be discarded if they have not been integrated into final results.

4. **What will happen if you agree to take part?**

If you agree to take part in the interview, I will contact you again to arrange a suitable date and time for the interview to take place, which would be on university premises. The interview will be between 1 and 2 hours in duration and will take part as a small group of between 5 – 10 students. Your participation in the project will be kept confidential and you are not under any obligation to provide any personal details during the interview.

5. **What will happen to any information**

The results, conclusions and recommendations from the focus group will be fed back to the Chartered Institute of Building with the aim of influencing policy on the process to become a Chartered Member. Any data collected from you will be stored securely and used as evidence to support the research.

You will be given a copy of this to keep, together with a copy of your consent form.

RESEARCH PARTICIPANT CONSENT FORM

Title of the project: **The links between professional competence, professional capability and academic processes**

Main investigator and contact details:

Peter Crabtree. I can be contacted by email: peter.crabtree@student.anglia.ac.uk
Tel: 0845 196 3958

Members of the research team. Supervisors: Dr Alan Coday and Ian Frame.

1. I agree to take part in the above research. I have read the Participant Information Sheet, which is attached to this form. I understand what my role will be in this research, and all my questions have been answered to my satisfaction.

2. I understand that I am free to withdraw from the research at any time, for any reason and without prejudice.

3. I have been informed that the confidentiality of the information I provide will be safeguarded.

4. I am free to ask any questions at any time before and during the study.

5. I have been provided with a copy of this form and the Participant Information Sheet.

Data Protection: I agree to the University[1] processing personal data, which I have supplied. I agree to the processing of such data for any purposes connected with the Research Project as outlined to me.

Name of participant (print)……Signed……..….Date……

Name of witness (print)……..Signed……..….Date……

YOU WILL BE GIVEN A COPY OF THIS FORM TO KEEP

If you wish to withdraw from the research, please complete the form below and return to the main investigator named above.

Title of Project:
I WISH TO WITHDRAW FROM THIS STUDY

Signed: _____ Date: _____

_____

[1] "The University" includes Anglia Ruskin University and its partner colleges

Appendix 7.1: Results for pairwise comparison of ways of learning between full time and part time students - Mann-Whitney's U-test

Ranks

studymode		N	Mean Rank	Sum of Ranks
Reading	Full time	45	79.17	3562.50
	Part time	114	80.33	9157.50
	Total	159		
Thinking	Full time	45	89.20	4014.00
	Part time	114	76.37	8706.00
	Total	159		
Observing	Full time	45	96.59	4346.50
	Part time	114	73.45	8373.50
	Total	159		
Q and A	Full time	45	78.51	3533.00
	Part time	114	80.59	9187.00
	Total	159		
Browsing	Full time	45	93.87	4224.00
	Part time	114	74.53	8496.00
	Total	159		
Doing	Full time	45	84.71	3812.00
	Part time	114	78.14	8908.00
	Total	159		
Reflecting	Full time	45	88.34	3975.50
	Part time	114	76.71	8744.50
	Total	159		
Role play	Full time	45	85.03	3826.50
	Part time	114	78.01	8893.50
	Total	159		

Test Statistics[a]

			Reading	Thinking	Observing	Q and A	Browsing	Doing	Reflecting	Role play
Mann-Whitney U			2527.500	2151.000	1818.500	2498.000	1941.000	2353.000	2189.500	2338.500
Wilcoxon W			3562.500	8706.000	8373.500	3533.000	8496.000	8908.000	8744.500	8893.500
Z			-.151	-1.665	-2.993	-.270	-2.496	-.893	-1.511	-.899
Asymp. Sig. (2-tailed)			.880	.096	.003	.787	.013	.372	.131	.368
Monte Carlo Sig. (2-tailed)	Sig.		.879[b]	.093[b]	.003[b]	.801[b]	.011[b]	.377[b]	.129[b]	.363[b]
	99% Confidence Interval	Lower Bound	.871	.086	.001	.791	.008	.364	.120	.351
		Upper Bound	.887	.101	.004	.811	.014	.389	.138	.376
Monte Carlo Sig. (1-tailed)	Sig.		.447[b]	.045[b]	.001[b]	.400[b]	.006[b]	.192[b]	.063[b]	.179[b]
	99% Confidence Interval	Lower Bound	.434	.039	.000	.387	.004	.182	.057	.170
		Upper Bound	.460	.050	.002	.413	.008	.202	.069	.189

a. Grouping Variable: studymode

b. Based on 10000 sampled tables with starting seed 2000000.

The data is of ordinal (Likert items) so qualifies under Assumption #1:
The variables are from two independent groups - qualifies Assumption #2:
The two groups have no relations - qualifying Assumption #3:
An assumption was made that the variables are not normally distributed - Assumption #4:

Appendix 7.2: Hypothesis test results for pairwise comparison of ways of learning between year groups - Mann-Whitney's U-test

$H_{2\text{-main}}$:

The number of years/credits studied at the university significantly affects the way students learn. The results are broken down and analysed in three groups: Group 1 – part-time students 5-6 years study (58%) and full-time students 3 years study (96%); Group 2 – part-time students 3-4 years study (29%) and full-time students 2 years study (2%) and Group 3 – part-time students 1-2 years study (5%) and full-time students 1 year study (0%). The three groupings represent the credit level of modules studied at university (Group 1 – levels 4, 5 and 6; Group 2 – levels 5 and 6, and Group 3 – level 6). Learning approaches adopted by those students that started at university at level 4 – Group 1 (1^{st} year undergraduate) are statistically different to advanced entry students – Groups 2 and 3 using the null hypothesis (Ho) that there is no significant difference at the 5% level.

Test hypotheses for the main hypothesis 2 ($H_{2\text{-main}}$):

- **H_{01}**: Pairwise comparison of median (critical U values) for Reading is identical for both Group 3 and Group 2
- **H_{02}**: Pairwise comparison of median (critical U values) for Thinking is identical for both Group 3 and Group 2
- **H_{03}**: Pairwise comparison of median (critical U values) for Observing is identical for both Group 3 and Group 2
- **H_{04}**: Pairwise comparison of median (critical U values) for Question and Answer are identical for both Group 3 and Group 2
- **H_{05}**: Pairwise comparison of median (critical U values) for Browsing is identical for both Group 3 and Group 2
- **H_{06}**: Pairwise comparison of median (critical U values) for Doing is identical for both Group 3 and Group 2

H_{07}: Pairwise comparison of median (critical U values) for Reflecting is identical for both Group 3 and Group 2

H_{08}: Pairwise comparison of median (critical U values) for Role-play is identical for both Group 3 and Group 2

More hypotheses for Group 3 vs. Group 1 and Group 2 vs. Group 1 are checked, as above.

Summary results for pairwise comparison of ways of learning between year groups - Mann-Whitney's U-test

Group 3 vs. Group 2			**Group 3 vs. Group 1**			**Group 2 vs. Group 1**		
Test Hypo.	**U-test**	**Sig**	**Test hypo.**	**U-test**	**Sig**	**Test hypo.**	**U-test**	**Sig**
H_{01}	196.00	**0.045**	**H_{09}**	170.00	0.053	**H_{017}**	2904.50	0.873
H_{02}	156.50	**0.010**	**H_{010}**	184.50	0.088	**H_{018}**	2352.50	**0.023**
H_{03}	242.50	0.187	**H_{011}**	263.00	0.720	**H_{019}**	2385.00	**0.033**
H_{04}	299.00	0.642	**H_{012}**	224.50	0.307	**H_{020}**	2576.50	0.156
H_{05}	292.00	0.558	**H_{013}**	268.50	0.791	**H_{021}**	2296.50	**0.013**
H_{06}	277.50	0.401	**H_{014}**	240.50	0.438	**H_{022}**	2871.00	0.763
H_{07}	264.00	0.316	**H_{015}**	242.00	0.469	**H_{023}**	2763.00	0.483
H_{08}	202.00	0.059	**H_{016}**	172.00	0.063	**H_{024}**	2836.00	0.793

The five hypotheses below were not validated:

H_{01}: The pairwise comparison shows no statistically identical medians between Group 3 vs. Group 2 (**$\rho<0.05$).** This suggests that reading is more important to Group 2 (mean rank = 47.64) than Group 3 (mean rank = 29.00).

H_{02}: The pairwise comparison shows no statistically identical medians between Group 3 vs. Group 2 (**$\rho<0.01$**). The results suggest that thinking is more important to Group 2 (mean rank = 48.11) than Group 3 (mean rank = 24.06).

H_{18}: The pairwise comparison shows no statistically identical medians between Group 2 vs. Group 1 (**$\rho<0.05$).** This suggests that

thinking is more important to Group 2 (mean rank = 84.66) than Group 3 (mean rank = 69.13).

H_{19}: The pairwise comparison shows no statistically identical medians between Group 2 vs. Group 1 (**ρ<0.05).** This suggests that observing is more important to Group 2 (mean rank = 84.27) than Group 3 (mean rank = 69.59).

H_{21}: The pairwise comparison shows no statistically identical medians between Group 2 vs. Group 1 (**ρ<0.05).** This suggests that browsing is more important to Group 2 (mean rank = 85.33) than Group 3 (mean rank = 68.35).

The Kruskal Wallis test is a non-parametric test, which can be used to 'compare more than two groups' (du Prel et al., 2010, p.345) and is used to 'test the null hypothesis that all populations have identical distribution functions against the alternative hypothesis that at least two of the samples differ only with respect to location (median), if at all' (Easton and McColl, 2004). The higher the chi-square value the more significant is the difference.

Test hypotheses for the main hypothesis:

H_{01}: K-sample comparison of chi-square value for Reading is identical for Group 1, Group 2 and Group 3

H_{02}: K-sample comparison of chi-square value for Thinking is identical for Group 1, Group 2 and Group 3

H_{03}: K-sample comparison of chi-square value for Observing is identical for Group 1, Group 2 and Group 3

H_{04}: K-sample comparison of chi-square value for Question and Answer is identical for Group 1, Group 2 and Group 3

H_{05}: K-sample comparison of chi-square value for Browsing is identical for Group 1, Group 2 and Group 3

H_{06}: K-sample comparison of chi-square value for Doing is identical for Group 1, Group 2 and Group 3

H_{07}: K-sample comparison of chi-square value for Reflecting is identical for Group 1, Group 2 and Group 3

H_{08}: K-sample comparison of chi-square value for Role-play is identical for Group 1, Group 2 and Group 3

Test results

A summary of the results for the three groups is presented in below with most of the hypotheses validated.

Summary results for comparison of ways of learning amongst groups of students - Kruskal Wallis test

Ways of learning	Mean ranks			Chi-Square	Sig
	Group 1	Group 2	Group 3		
H_{01}	83.7	82.63	50.25	4.1336	0.127
H_{02}	74.54	90.77	47.13	10.0691	0.007
H_{03}	73.89	89.34	67.669	5.3729	0.068
H_{04}	87.55	77.44	69.94	2.5534	0.279
H_{05}	72.13	89.81	78.44	6.0163	0.049
H_{06}	81.05	83.07	69.25	0.7805	0.677
H_{07}	79.51	84.53	67.75	1.2936	0.524
H_{08}	81.56	83.4	51.25	3.7638	0.152

The two hypotheses below were not validated:

H_{02}: The K-sample comparison shows no statistically identical chi-square values between Group 1, Group 2 and Group 3 (**$\rho<0.01$**). The results indicate a very strong difference and they suggest that thinking is more important to Group 2 (mean rank = 90.77) than Group 1 (mean rank = 74.54) and Group 3 (mean rank = 47.13).

H_{05}: The K-sample comparison shows no statistically identical chi-square values between Group 1, Group 2 and Group 3 (**$\rho<0.05$).** The results indicate a strong difference and this suggests that browsing is more important to Group 2 (mean rank = 89.81) than Group 1 (mean rank = 72.13) and Group 3 (mean rank = 78.44).

Appendix 7.3: Hypothesis test results for Spearman's rho correlations, the Cross tabulation and Kendall's-Tau[b] test of concordance for the definitions of learning

$H_{3\text{-main}}$:

There is a statistically significant relationship between those students who opted for definitions of learning L3 as well as L4.

Test hypotheses for the main hypothesis 3 ($H_{3\text{-main}}$):

H_{01}: L1 and L2 are strongly and positively correlated

H_{02}: L1 and L3 are strongly and positively correlated

H_{03}: L1 and L4 are strongly and positively correlated

H_{04}: L1 and L5 are strongly and positively correlated

H_{05}: L2 and L3 are strongly and positively correlated

H_{06}: L2 and L4 are strongly and positively correlated

H_{07}: L2 and L5 are strongly and positively correlated

H_{08}: L3 and L4 are strongly and positively correlated

H_{09}: L3 and L5 are strongly and positively correlated

H_{010}: L4 and L5 are strongly and positively correlated

Test results

Two tests were carried out to test the hypotheses: Spearman's rho correlations and Cross tabulation with an option of Kendall's-Tau[b] test of concordance. Cross tabulations which is a descriptive statistic help to better understand deviation in the ways students selected their learning definitions, while correlations will explain existing relationships in the way to the define learning. A summary of the results for Spearman's rho correlations, the Cross tabulation and Kendall's-Tau[b] test of concordance are presented below.

Spearman's rho correlations for the definitions of learning

		L1	L2	L3	L4	L5
L1	rho	1.000				
	sig					
L2	rho	-.073	1.000			
	sig	.349				
L3	rho	-.072	-.096	1.000		
	sig	.358	.222			
L4	rho	.213**	-.015	.094	1.000	
	sig	.006	.853	.231		
L5	rho	-.260**	-.058	-.101	.019	1.000
	sig	.001	.458	.197	.810	

**. Correlation is significant at the 0.01 level (2-tailed).

Cross tabulation and Kendall's-Tau^{b} test of concordance

		L1				L2				L3				L4			
		matc		Kendall's Taub				Kendall's Taub				Kendall's Taub				Kendall's Taub	
		No	Yes	Tau^{b}	sig	No	Yes	Tau^{b}	sig	No	Yes	Tau^{b}	sig	No	Yes	Tau^{b}	sig
L2	No	57	66	-0.073	0.346												
	Yes	23	19														
L3	No	15	21	-0.072	0.352	24	12	-0.096	0.250								
	Yes	65	64			99	30										
L4	No	19	7	**0.213**	**0.006**	19	7	-0.015	0.854	8	18	0.094	0.278				
	Yes	61	78			104	35			28	111						
L5	No	37	61	**-0.260**	**0.001**	71	27	-0.058	0.448	18	80	-0.101	0.204	16	82	0.019	0.807
	Yes	43	24			52	15			18	49			10	57		

Appendix 7.4: Overview of the five companies and higher-level personnel involved in the preliminary study

Company	Nature of business	Number of directly employed personnel	Level of education and experience of the respondent	How the respondent achieved their higher-level position within the company
A	Construction contracting in the East of England	1000	ONC, HNC, MSc, PhD, Fellow of the Chartered Institute of Building (FCIOB), Member of the Royal Institution of Chartered Surveyors (MRICS), 20 years professional experience	Through site/project management, corporate management and directorship
B	Housing contracts/ developer	230	ONC, HNC, CIOB DMX, 15 – 20 years professional experience	Surveyor, surveying director, operations director, construction director and managing director
C	General contractor in the East of England	110	BSc, MICE, 17 years professional experience	Site engineer, design engineer, manager and managing director
D	Groundwork, infrastructure, shell and core structures	450	A levels, ONC, HNC, DMS, MICE, MCPD, 10 years professional experience	Through land surveying, change management, consultancy, personnel management, directorship
E	Structural design practice	3	ONC, HNC, 34 years professional experience	Engineer, underwater inspector, principal of the company

Appendix 7.5: Responses to the content of a construction management degree

Company	Skills and knowledge sets that are important in the field of construction management	Emerging ideas	Should an honours degree in construction management have a WBL element	Emerging ideas
A	Very varied but I think underpinned at all times by a good understanding of the construction process as often as not the issues that trouble us are ones of procurement and therefore you must understand the basics very well in order to make a sensible contribute to their resolution.	Understanding of construction process	Yes. I believe they should. Perhaps not a year out but I think to encourage some kind of summer holiday work or similar is really good. To gain some experience on the job.	WBL
B	From my assessment, I think what is important is an understanding of technology. The course gives our management trainees an understanding of the management approach and therefore equips them well to perform in the business in the management process. When I look at our production personnel, it misses some of the nuts and bolts of technology so they are in some ways assuming that the trades that they have are professional, or experienced in construction and therefore that the checking of what they are doing is a given and I don't necessarily believe that is the	Understanding of technology Management Innovation	Yes, courses should have a work-based element. It provides the reality of the conversion of theory into practice.	Theory into practice

	case. More to do with our sector and the capabilities of our supply chain than a global issue. And to a lesser extent I believe that our commercial and technical departments have limited understanding of the technical aspects of the technologies involved perhaps leaves us a little bit vulnerable to innovative design, technical challenge design, and improving design solutions, and in commercial applying buildability from a commercial point of view.			
C	People management skills, technical skills. An experienced site manager has to be pretty familiar with most forms of construction because we're not specialist nowadays. One day it will be a timber-frame and the next day it will be something else. We do specialise between building and civil engineering and housing, but within those sectors we don't really specialise. Technical knowledge of most forms of construction as he's going to be the one to see if the drawings are wrong, if something's installed wrong or what the problems might be so that he can pre-empt them before they happen. Technical skills are slightly second to people	People management skills Technical skills	Yes, I think they should.	

	management skills because at the end of the day, construction companies build things with sub-contractors or staff, subsidiary staff, but the site manager is not building so he needs to motivate those people and I don't mean motivation in the dictatorial style, he needs to learn how to get it done at the time he wants it, in the way he wants it. He has to be forceful and those soft skills don't always work on site, but if he's in the office managing administration or marketing teams he has to have more subtle management skills, so <u>good people skills</u> for the people who have their career into something more than what they started with, have got the skills to deal with different people appropriately. That's more important than the technical knowledge. How you teach people skills is an interesting one!			
D	*There are obviously <u>technical skills</u> about what surveying is about but for this business that's as equally as important is around <u>relationships,</u> about their <u>personal skills in dealing with people</u>. We could have the best surveyor in the world and if he's not a nice person to get on with, or he's not got the right relationship with the client, it*	Technical skills Relationships Personal skills Attitude Behaviour	*An absolute 5 for me with that one.*	

	doesn't matter if he's the best surveyor in the world. When we choose our surveyors here at XXXXX, it's as much on the technical as it is about attitude and behaviour.			
E	*I think maths and physics are a must for construction or civil engineering. Those basic maths and physics skills for manipulation and looking at problems are absolutely essential.*	Maths and physics	*Yes. I think it is tremendously important that people get out there – there's so much to learn. We do get involved with various companies that have graduates on a year out, civil engineering firms that I work with employs quite a lot of graduates, sponsors them. When they first come from university for their year out they are "green", and then after the year you see their development and their practical approach on site, which is hugely important. Yes, it is hugely important, if not one of the most important things.*	Development WBL

Appendix 7.6: Overview of the eight companies and higher-level personnel involved in the subsequent study

Company	Nature of business	Number of directly employed personnel	Level of education and experience of the respondent	How the respondent achieved their higher-level position within the company
F	Repair and maintenance of hosing stock	170	C&G, Advanced C&G, Certificate/Diploma Site Management, NVQ5, MSc, MCIOB	Through construction management route
G	Civil engineering, specialist groundworks, geotechnical plant hire and commercial development	290	LIOB, IQS, FCIOB	Initially technical director because I had the expertise, and then board director, then managing director and then last 20 years as group MD sitting on the boards of all the different companies.
H	Speculative housing development	29	BTEC, HTECH	Through the Chief Surveyor role to Commercial Manager
I	Multi-disciplinary consultancy	400	Professional qualification in banking BSc, MCIOB	I followed my studies through and later was invited to join the company that I now work for to set up a project management team and that was 3½ years ago. The project management team has expanded from just me 3½ years ago to now 6 PMs and 3 QS's
J	Construction company	115	Ordinary National Diploma, Higher National Diploma	Managing Director
K	Construction and development	109	Level 3 Certificates in Training Practice and HR Practice	Currently HR Manager, working my way up through the company
L	Engineering Design Practice	2	BSc, MEng, MICE	Structural Engineer running own engineering design practice
M	Construction and property maintenance	90	C&G, Advanced C&G, HNC, DMX, MCIOB	Started off on the tools, then site manager and progressed to contracts manager. Now senior contracts manager

Appendix 7.7: Responses to being a professional and the work of a professional

Company	The respondents view on whether they are a professional and if so, why?	Emerging ideas	What is the work of a professional in the construction industry?	Emerging ideas
A	Yes in terms of my professional recognition, being a fellow of the CIOB and a member of the RICS, chartered institute of arbitrators etc. Most of those would show that I am a professional. However I work for a construction company and not professional practice. Some of my qualifications are to ensure that I have a level playing field with my peers, that my company can qualify for tender lists and opportunities to carry out work but often a contractor is not seen in quite the same way as a professional impartially giving advice to an employer. Although we do give lots of advice to employers, we then end up delivering too. So I am not quite as professional as my colleagues in professional practice. And my daily role is not about being professional all the time, it's about making money and that is the primary motive of why we exist albeit we suppress it with fancy phraseology about being the	Professional recognition Level of qualifications Level of professionalism Ethics: professional versus money	I guess the definition I would have to read up, but my immediate perception of a professional would be someone in the industry we work in who might be a PQS or a professional architect, or similar offering that neutrality and impartial advice. I just recognise a slight difference from what they do and what I do. I wouldn't say necessarily that I'm not a professional or that a lecturer is not a professional, I just feel slightly less so than somebody like a lawyer or an architect. On the scale but not quite extreme end as the earlier classification.	Neutrality and impartial advice

	"contractor of choice" and "exceeding our customers' expectations". All of that is a means to an end and we do need to do all of that in order to make a small return.			
B	I would describe myself as a professional. I don't associate that purely with having a professional qualification. I believe my actions in managing the operations of the business are done on a professional basis and I represent the business and I also provide leadership and support to the staff and by my actions look to demonstrate how they should conduct themselves.	Actions Leadership Role models Specialists	To my mind I think it would possibly fall into two categories i.e. I do recognise that professionals in our industry are those people that represent the interests of the client in terms of a professional team which is a tag we give it, those people who are professionally qualified and perform specialist roles, advisers within the industry. In the other context it is about conduct, it is about people who are either seen as role models or demonstrate a professional approach to the way they conduct their affairs.	Conduct/behaviour Expectation
C	Yes, definitely. Partly because I have the qualifications, but also because I feel equal to the professionals that I interact with such as the architects, quantity surveyors etc. and I'm seen as equal by my peers in those organisations.	Qualifications Respect	A professional is respected. He has a technical knowledge that maybe the man on the street doesn't have. It is the expertise that is learned or trained that another person doesn't have, and therefore you need to rely on him for his expert guidance in whatever field he is expert in, as well as having the technical qualification. My expertise is how	Qualifications Respect Technical knowledge Expertise Advice Experience Tacit knowledge

			to build things, more cheaply and safer, and to advise others.	
D	*The work of a professional – a lot of it comes down to... well I know some very poor professionals. I think there are two key things to learn about attitude and behaviour – what you do with your profession or skill, how you apply it to others either as a business or into teams that you are working for. I know some very interesting professionals who are very insular – they are very good at what they do, very specialist but that's as far as it goes.*	Attitude Behaviour Application	*For me a professional person is someone that actually wants to share that knowledge outside of themselves.*	Knowledge
E	*Yes, I would describe myself as a professional in as much it is what I do and is the same work as anyone in my field. I initiate the design, I'm responsible for it I see no difference at all the others apart from that I don't belong to a professional institute.*	Responsibility	*Someone who uses their skill and knowledge to initiate a design or a system for solving a particular problem.*	Skills Knowledge Initiative
F	*Yes I would describe myself as a professional and I would back that up by saying that I've worked myself up through the industry, got a good understanding of what happens at grass roots level in terms of operatives on a construction site through being a*	Role models	*I think the work of a professional should be an exemplar standard in terms of the whole thing in terms of their dress, their appearance, their knowledge, their skillset, communications etc. and I think that the professional part is a mixture of all of those things.*	Role models

	carpenter, and then I've progressed up, obviously MCIOB, registered member of the Association of Project Safety, also a member of the Chartered Management Institute, I think being that professional is being a good advocate for the industry.			
G	*That's an interesting question. You look at the age I am now and the expertise you have you look back and you would always offer especially the practice that we were running, chartered surveyors and building surveyors that you were always a professional. But because my role was split between running the companies, which is a commercial role, I always felt that I had a foot in each camp and even to this day now acting as a consultant I still feel I have a dual role which is as the professional because you advise on all the roles that I am doing as a consultant at the moment. About 3 or 4 years ago one of my sons joined quite a large construction company who I knew the MD and they asked us to come and act as a professional and literally have a role through the company of digesting what they were doing and trying to promote better*	Advice	*Judgment isn't it. What is a professional? Whether you're a surgeon, charter surveyor, chartered civil engineer, chartered accountant, you sit there and the more senior you become the more judgment you can make. I think it's the professionalism, the word professionalism is that you have got experience, academically, physically, practically whether you are a surgeon, or whatever you end up with the word professional. The more experience you have, the more confident you are, the more ability you have to explain to people and you sit in judgment. It's like a judge, I'm a duty man and I've got two judges in my syndicate and it's very interesting listening to them because they have to make judgements on family bench on people and that is only come through experience, we have very similar qualifications you sit there and a professional advises, he listens, I think that's a*	Judgement Confidence Experience

	management, more efficient ways of running the company so my role for four months was to interview all the directors, including the owner the management director and go to all the construction sites to look at different roles, whether their plant was running economically. So I think the answer is that I still feel that I have that ability to have one foot in each camp so yes a professional and yes a commercial role.		*great thing you've got to be a great listener, collate all the information together as you're doing with your doctorate here, listen to the problem, listen to the people and then make a judgment professionally*	
H	*I think most other people would describe me as a professional before I would. No, I don't see myself that way. My formal education going through to a degree or anything like that, I haven't followed that path. I don't really know what a professional is. I know what a professional footballer is, I know what a professional this, that and the other is, but as a professional no, I don't really, I'm not really comfortable with that description. I like the description of "management" management of people, it's probably something that I would say if I'm honest that I do reasonably well. I always remember thinking when I went into managing people that out of*	Development	*I don't like that word! I'm very tempted to say a "professional what"? I can't really answer the question simply because I don't really like the idea of "a professional". I always think a professional what? A professional football player? A professional this, that and the other? To me professional doesn't really mean very much. It's just a personal thing I guess. I'd much rather think down the lines of <u>capability and competence</u> that you've used. Professional, sorry, doesn't register*	Competence Capable

	the aspects of surveying and management, I was probably better at management than surveying. It's <u>the people management side I enjoy and developing those people and bringing them through</u> and that may give you a clue as to why I've gone that route rather the education route. Peter – I'll ask you a sub-question to that and that is do you think you could become either a member of RICS or CIOB with what you are currently doing at the moment? *With CIOB, yes. The RICS I would have my doubts.* Peter – and therefore if you were to become a member of CIOB would you be classified as a professional? *Yes*			
I	*I would describe myself as a professional. Professional in the way that I go about my work, but also professional in my understanding of how business occurs and happens and also academically professional. I like things to be done properly and well and I want to help others to buy into that and to <u>support</u> that as well. I like my team to be very professional about what they do.*	Conduct/behaviour Role models	*It's where you've done your best; the finished product may not be perfect, but given the constraints that you've worked within, whether that's time, cost, money, ability, training, whatever those constraints are, if you've <u>given it of your best and delivered it at a professional level</u> then that is professional delivery.*	Conduct/behaviour Role models

	So yes, I do consider myself to be a professional.			
J	*I would describe myself as a professional even though I haven't actually got a professional qualification for the simple reason that I spent all of my learning on the professional side, the chartered quantity surveying and management.*		*I'd always term a professional as being somebody who can see both sides and not somebody that is just professional on one side only but can see both sides of the fence and understand it and make a proper, professional decision based on both sides. The ability to see plus and minuses.*	Compromise
K	*Although I'm not fully qualified, yes, I would describe myself as a professional. Although I'm a generalist HR, obviously there are specialists out there, I feel that the knowledge-base that I have and the expectation on me and what I can achieve, I feel that in essence I am a professional. I am only an Associated Member of the CIPD, as I say if I do the full qualification I will become a full member but I do look on myself as a professional, what's expected of me and what I achieve.*	Knowledge Expectation	*I suppose the way in which they go about what they do, the manner in which they conduct themselves, as well as the learning and experience that they hold as well. I suppose if someone is doing something to the best of their ability, whether they have a qualification that says that or not, they are professional in how they conduct themselves in their field whether that's a real expertise or something lesser. I think it's more about how they define themselves in that category.*	Ability Conduct/behaviour
L	*I would definitely describe myself as a professional and recognised by being a member of the Institute of civil engineers.*	Professional recognition	*A professional is someone who is competent at carrying out a particular task and being able to work in a professional environment, gaining the respect of colleagues whether that be*	Professional recognition

			people they work with or work for like a client. Having a professional qualification is also the sign of being a professional.	
M	*I do believe I'm a professional because I have to deal with lots of professions whether it is architects or surveyors. I also have to act in a professional way especially with the client and I think my experience demonstrates that I am professional.*	Conduct/behaviour	*A professional is somebody who has respect somebody has confidence that they can do the job and somebody who regularly does do the job but with very little praise.*	Respect Conduct/behaviour

Appendix 7.8: Emerging Ideas

Ability
Academia/employer engagement
Academic environment
Academic knowledge
Academic study
Academic study and experience
Academic qualifications
Across a range of spectrums
Actions
Advancement
Advice
Analysis
Application
Applied learning
Applying oneself
Appropriate experience
Appropriateness of workplace
Assessment
Attainment
Attitude
Balance
Balance between theory and practice
Barrier to entry
Baseline
Baseline of academic skills
Basic academic skills
Basic minimum scientific knowledge
Basic tools
Behaviour
Broad profile
Broader sense of education
Business needs
Capability is not fixed, along a continuum
Capable
Career progression
Change
Commitment
Common sense
Communication
Competence
Compromise
Concrete experiences
Conduct/behaviour
Confidence
Consistently
CPD
Credibility
Demonstrate
Depth of competency
Depth of learning
Depth versus breadth
Desire
Developing potential
Development
Differentiator
Diverse
Doing
Doing your job
Ethics: professional versus money
Evidence
Expectations
Experience
Expertise
Exposure
Filling a gap
Flexibility
Flexible
Forethought
Formal training
Future
Gap analysis
General competence
Graduate qualifications
Grey areas
Guidance
Health and safety
Improvement
Improving skill set
Industry based projects
Informal training
Initiative
Innovation
Inter-personal relationships
Interest

Involvement
Job training
Judgement
Key performance indicators
Knowledge
Lack of integration
Leadership
Learn by experience
Learning
Level of education
Level of experience
Level of knowledge
Level of professionalism
Level of qualifications
Liability
Looking ahead
Management
Maths and physics
Mentor
Must have's and nice to have
Narrow
Neutrality and impartial advice
Objectives
Partnerships
People management skills
Performance
Personal competence
Personal experiences
Personal integrity
Personal skills
Physical experience
Planning
Practical background
Practical experience
Practical knowledge
Problem solve
Profession
Professional recognition
Professionalism
Profiling
Qualifications
Qualified staff
Real experience
Reflection
Relationships
Relevance
Relevance of courses
Report writing
Respect
Responsibility
Risk taking
Role models
Self-motivation
Site experience
Skills
Specialist
Specific competence
Spectrum of skills
Standard
Structure
Suitability of workplace
Tacit knowledge
Teaching
Team
Technical competence
Technical knowledge
Technical skills
Theory into practice
Time
Understanding of construction process
Understanding of technology
Up to-date
Void in professional training
Wide spectrum of knowledge
Willingness
WBL
Work ethic
Work ethos
Work experience
Working together
Workplace
Workplace assessment
Workplace champion

Appendix 7.9: Revised list of emerging ideas

Ability
Academic (broad, environment, experience, knowledge, qualifications, study)
Across a range of spectrums (narrow, broad)
Advancement
Advice
Analysis
Application (learning, oneself)
Appropriate (experience, workplace)
Assessment
Attainment
Attitude
Balance between theory and practice
Barrier to entry
Basic academic skills including scientific knowledge
Behaviour
Business needs
Capability is not fixed, along a continuum
Career progression
Change
Commitment
Common sense
Communication
Competence (general, specific)
Compromise
Conduct/behaviour
Confidence
Consistently
CPD
Credibility
Demonstrate/evidence
Depth (breadth, competency, learning)
Desire
Developing potential
Differentiator
Mentor
Diverse
Doing your job
Ethics: professional versus money
Expectations
Experience (concrete, physical, real, site)
Expertise
Exposure
Filling a gap
Flexibility
Forethought
Future
Gap analysis
Grey areas
Guidance
Health and safety
Improvement
Improving skill set
Industry based projects
Informal and formal training
Initiative
Innovation
Inter-personal relationships
Interest
Involvement
Job training
Judgement
Key performance indicators
Knowledge (academic, tacit, wide spectrum)
Lack of integration
Leadership
Learning
Level (education, experience, knowledge, professionalism, qualifications)
Looking ahead
Management
Risk taking

Must have's and nice to have
Neutrality and impartial advice
Objectives
Partnerships
People management skills
Performance
Personal (competence, experience, integrity, skills)
Planning
Practical (background, experience, knowledge)
Problem solve
Professional recognition
Profiling
Qualified staff
Reflection
Relationships
Relevance
Report writing
Respect
Responsibility
Role models
Self-motivation
Specialist
Spectrum of skills
Standard
Structure
Teaching
Team
Technical (competence, knowledge, skills)
Theory into practice
Understanding of construction process and technology
Up to-date
Void in professional training
Willingness
WBL
Work (experience, ethic, ethos)
Working together

Appendix 7.10: Emerging ideas clusters

Academic and industry engagement

Theme	Code
Appropriate (experience, workplace)	Aie-Awp
Diverse	Aie-Div
Grey areas	Aie-Gre
Industry based projects	Aie-Ind
Informal and formal training	Aie-Inf
Lack of integration	Aie-Lac
Partnerships	Aie-Par
Theory into practice	Aie-Ttp
Workplace (assessment, champion, suitability)	Aie-Was
WBL	Aie-Wbl
Working together	Aie-Wor

Actions

Theme	Code
Advice	Act-Adi
Advancement	Act-Adv
Analysis	Act-Ana
Application (learning, oneself, team)	Act-App
Behaviour	Act-Beh
Change	Act-Cha
Commitment	Act-Com
Consistently	Act-Con
Compromise	Act-Cop
Credibility	Act-Cre
Demonstrate/evidence	Act-Dem
Differentiator	Act-Dif
Expectations	Act Exp
Forethought	Act-For
Improvement	Act-Imp
Innovation	Act-Inn
Interest	Act-Ins
Judgement	Act-Jud
Neutrality and impartial advice	Act-Neu
Planning	Act-Pla
Reflection	Act-Ref
Responsibility	Act-Rep
Respect	Act-Res

Risk taking	Act-Ris
Self-motivation	Act-Sel
Up to-date	Act-Utd
Willingness	Act-Wil

Education

Theme	Code
Academic (broad, environment, experience, knowledge, qualifications, study)	Edu-Ase
Assessment	Edu-Ass
Attainment	Edu-Att
Barrier to entry	Edu-Bar
Basic academic skills including scientific knowledge	Edu-Bas
Balance between theory and practice	Edu-Bte
Capability is not fixed, along a continuum	Edu-Cnc
Understanding of construction process and technology	Edu-Cpt
Depth (breadth, competency, learning)	Edu-Dol
Learning	Edu-Ler
Ethics: professional versus money	Edu-Pvm
Across a range of spectrums (narrow, broad)	Edu-Ran
Relevance	Edu-Rel
Report writing	Edu-Rep
Teaching	Edu-Tea
Technical (competence, knowledge, skills)	Edu-Tec

Personal (development, enhancement, performance and self)

Theme	Code
Ability	Per-Abi
Attitude	Per-Att
Career progression	Per-Car
Common sense	Per-Sen
Communication	Per-Com
Conduct/behaviour	Per-Cbh
Confidence	Per-Con
Competence (general, specific)	Per-Cop
CPD	Per-Cpd
Desire	Per-Des
Developing potential	Per-Stk
Flexibility	Per-Fle
Future	Per-Fut
Improving skill set	Per-Imp
Initiative	Per-Int

Involvement	Per-Inv
Inter-personal relationships	Per-Ipr
Knowledge (academic, tacit, wide spectrum)	Per-Knw
Looking ahead	Per-Lah
Leadership	Per-Led
Level (education, experience, knowledge, professionalism, qualifications)	Per-Loc
Performance	Per-Per
Personal (competence, experience, integrity, skills)	Per-Pes
Practical (background, experience, knowledge)	Per-Pra
Spectrum of skills	Per-Spe
Void in professional training	Per-Vpt

Work

Theme	**Code**
Business needs	Wor-Bus
Doing your job	Wor-Eth
Experience (concrete, physical, real, site)	Wor-Exp
Exposure	Wor-Exs
Expertise	Wor-Ext
Filling a gap	Wor-Fag
Gap analysis	Wor-Gap
Guidance	Wor-Gui
Health and safety	Wor-Has
Job training	Wor-Job
Key performance indicators	Wor-KPI
Management	Wor-Man
Mentor	Wor-Men
Must have's and nice to have	Wor-Mus
Objectives	Wor-Obj
People management skills	Wor-Pms
Professional recognition	Wor-Pre
Profiling	Wor-Pro
Problem solve	Wor-Prs
Qualified staff	Wor-Qst
Role models	Wor-Rmd
Specialist	Wor-Spe
Standard	Wor-Sta
Structure	Wor-Str
Work (experience, ethic, ethos)	Wor-Wor

Appendix 7.11: Coverage of skill sets by mode of study (mean average responses) on the CSFs

Full time study

Area\Course	Architecture	Architectural Technology	Civil Engineering	Construction Management	Quantity Surveying	**All courses**
Knowledge and understanding	3.46	3.85	2.92	2.98	3.35	**3.31**
Intellectual (Thinking skills)	3.36	3.67	2.61	2.90	3.41	**3.19**
Practical skills	3.69	3.97	3.05	3.02	4.15	**3.58**
Transferrable skills	3.43	3.75	2.80	3.33	3.53	**3.37**

Part time study

Area\Course	Architecture	Architectural Technology	Civil Engineering	Construction Management	Quantity Surveying	**All courses**
Knowledge and understanding	N/A	3.25	2.92	3.35	3.51	**3.26**
Intellectual (Thinking skills)	N/A	3.75	2.61	3.20	3.31	**3.22**
Practical skills	N/A	3.92	3.09	3.56	3.86	**3.61**
Transferrable skills	N/A	3.72	2.73	3.30	3.26	**3.25**

Appendix 7.12: Coverage of skill sets for Construction Management (mean average responses) on the CSF

Construction Management

Knowledge and understanding	Application of IT	2.83
	Building construction (domestic, industrial and commercial)	3.60
	Built environment	3.97
	Business processes	3.34
	Construction processes	3.51
	Current issues at the forefront of theory and practice	3.06
	Data and information	2.69
	Economics	2.74
	Environmental issues	3.63
	Ethical issues	2.91
	Health and safety	2.97
	Law	2.77
	Materials	3.26
	Role of the construction manager	3.63
	Scientific principles related to construction	2.79
	Site and project management	3.51
	Sustainability and sustainable construction	3.91
Intellectual (thinking) skills	Analyse and evaluate	3.46
	Assimilate, memorise and recall	2.71
	Collect and record data	3.03
	Problem solving	3.14
	Professional awareness	3.23

Practical skills	Independence and self management	3.69
	Negotiation, leadership and management	3.23
	Planning and scheduling	3.54
	Research	3.37
	Teamwork	3.89
Transferrable skills	Communication (spoken, written and graphical)	3.60
	Enquiry and reflective self analysis	3.37
	Information technology and quantitative methods	3.29
	Learning strategies and study techniques	2.97

Appendix 7.13: Wordle of the definitions of the term PDP

Higher Level Personnel

Students


future
plan
development
personal
Planning
improve
develop
goals
process
aims
weaknesses
skills
objectives
achieve
career
strengths
PDP
work
person
knowledge
order
measure
towards
setting
identifying
throughout
progress
improvement
want
way
achieved
reflect
course
time
set
get
improving
produce
life
workload
areas
end
intend
main
difficult
involves
professional
period
helps
personally
worthwhile
approach
identifying
achievable
stages
date
analysis
cover
overall
skill
turning
support
route
based
opportunities
ahead
progressional
current
targets
made
portfolio
identifies
creating
Recording
scheduled
structured
lecturing
Working
developed
tracking
employability
reflecting
working
planning
Organising
SMART
study/job
measurable
taking
monitor
geared
going
greater
trying
attributes
qualifications
conduct
obtaining
done
systematically
timescales
something
final
needs
Sets
wish
level/competency
weakness
bespoke
report
specific
analyse
person
commitments
job
outcome
evidence
certain
regard
points
goal/continuation
manage
work
career
main
difficult
back
like
ability
macro
including
micro
learning
anything
idea
assessment
nice
subject
area
Making
keep
look
still
might
aid
need
ones
participant
goal
treats
attributes
later
system
see

Appendix 7.14: Draft 'super suite of employability skills and competencies'

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
1. Built environment 2. Business management 3. Contracts (administration and law) 4. Construction related computer applications 5. Construction technology 6. Data and information management 7. Disputes 8. Economics 9. Entrepreneurial and business skills (commercial awareness) 10. Financial management 11. Health and safety 12. Law 13. Leadership 14. Management 15. Monitoring and controlling 16. Negotiation 17. Planning and organising 18. Procurement 19. Professionalism, values and ethics 20. Scientific principles related to construction 21. Strategic management 22. Surveying 23. Sustainability	1. Analysis 2. Assimilate, memorise and recall 3. Communication 4. Data handling 5. Decision making 6. Developing and executing research 7. Improving ones own performance 8. Inter-personal skills 9. IT literate 10. Judgements 11. Learning strategies and study techniques 12. Literacy skills 13. Numeracy skills 14. Problem solving 15. Quantitative methods 16. Questioning 17. Teamwork 18. Time management 19. Working with others (groups)	1. Commitment to code of ethics 2. Commitment to CPD 3. Communication 4. Decision making 5. Developing people or teams 6. Implementing sustainable construction and development 7. Innovation 8. Knowledge of commercial, contractual and legal issues 9. Leadership and strategic/ financial management 10. Managing information 11. Managing health and safety 12. Managing quality 13. Personal effectiveness at work 14. Planning and organising work 15. Professional judgement and responsibility	1. Adaptability 2. Assertiveness 3. Attention to detail 4. Autonomy 5. Can do approach 6. Common-sense 7. Creative and imaginative thinking 8. Decisiveness 9. Forward thinking 10. Initiative 11. Integrity 12. Intuition 13. Open-mindedness 14. Positive attitude 15. Presentable 16. Professional 17. Reflectiveness 18. Respect 19. Responsibility 20. Self-motivation 21. Sensitivity 22. Visionary

Appendix 7.15: Updated draft 'super suite of employability skills and competencies'

Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)	Personal Attitudes and Attributes (Expectations of a Professional)
1. Built environment 2. Business management 3. Contracts (administration and law) 4. Construction related computer applications 5. Construction technology 6. Data and information management 7. Disputes 8. Economics 9. Entrepreneurial and business skills (commercial awareness) 10. Financial management 11. Health and safety 12. Law 13. Leadership 14. Management 15. Measurement 16. Monitoring and controlling 17. Negotiation 18. Planning and organising 19. Procurement 20. Professionalism, values and ethics 21. Scientific principles related to construction 22. Strategic management 23. Surveying 24. Sustainability	1. Analysis 2. Assimilate, memorise and recall 3. Communication 4. Data handling 5. Decision making 6. Developing and executing research 7. Improving ones own performance 8. Inter-personal skills 9. IT literate 10. Judgements 11. Learning strategies and study techniques 12. Literacy skills 13. Numeracy skills 14. Problem solving 15. Quantitative methods 16. Questioning 17. Teamwork 18. Time management 19. Working with others (groups)	1. Commitment to code of ethics 2. Commitment to CPD 3. Communication 4. Decision making 5. Developing people or teams 6. Implementing sustainable construction and development 7. Innovation 8. Knowledge of commercial, contractual and legal issues 9. Leadership and strategic/ financial management 10. Managing information 11. Managing health and safety 12. Managing quality 13. Personal effectiveness at work 14. Planning and organising work 15. Professional judgement and responsibility	1. Adaptability 2. Assertiveness 3. Attention to detail 4. Autonomy 5. Can do approach 6. Common-sense 7. Creative and imaginative thinking 8. Decisiveness 9. Forward thinking 10. Initiative 11. Integrity 12. Intuition 13. Open-mindedness 14. Positive attitude 15. Presentable 16. Professional 17. Reflectiveness 18. Respect 19. Responsibility 20. Self-motivation 21. Sensitivity 22. Visionary

Appendix 7.16: Mean average results of the potential benefits of a WBL curriculum

Potential benefits for students	Mean average response (1 totally disagree to 5 totally agree)
Application of classroom learning (both academic and vocational) in real world setting	4.13
Establishment of a clear connection between education and work	4.27
Improvement of their post-graduation employment opportunities	4.27
Development and practice of positive work related habits and attitudes including the ability to think critically, solve problems, work in teams, and resolve issues that relate to possible careers	3.47
Assessment and understanding the expectations of the workplace	3.40
Establishment of professional contacts for future employment	3.67
Expansion and refinement of their technical skills	3.73
Participation in authentic, job related tasks	4.07
Overall	***3.88***

Potential benefits for employers	Mean average response (1 totally disagree to 5 totally agree)
Involvement in the curriculum development process	3.27
An opportunity to provide community services	2.93
A pool of skilled and motivated potential future employees	4.20
Reduced training/recruitment costs	3.87
Developmental opportunities for a current workforce	3.67
Overall	***3.59***

Appendix 7.17: Criteria used in the development of a model of PDP and WBL to enhance traditional academic theory

Reference point	Criteria	Source of evidence
Learning environment	Students learn by doing and prefer tutorial and practical sessions rather than large whole group lecturers. Introduce work-based activities into the curriculum. For each learning session (e.g. lecture), tutors should outline the session, provide structure to the session and summarise the session. Ensure there is interaction between staff and students at both course and module level. Tutors need to demonstrate the application of knowledge to practical applications. Learning must be relevant (related to professional practice). Since reflection is a key part of the learning process include reflective activities.	Student questionnaire Schön (1983)
PDP	PDP activities should include a strong emphasis on ensuring students effectively market themselves, the importance of academic and non-academic activity, critical reflection which focuses on student competencies and career aspirations. The focus of PDP to be established: Is it professional, employment or academic, or all three? PDP activity should allow students to: • record, reflect and plan their personal progress and development through a progress file. • develop a specific set of competencies required for a predetermined career path on graduation. • to produce a CV, application form and accompanying letter. • to undertake a skills audit.	Edwards (2005) Clegg and Bradley (2006)

	• to develop their essay writing, report writing and presentation skills. • to undertake study skills to ensure their own academic development. PDP can be developed through three modular components: 1. Curriculum – embedded skills and employability components found within the course modules. The academic curriculum provides an opportunity for reflective practice to be developed. 2. Specific PDP module(s)/academic and personal tutorials – additional non-subject specific support provided. 3. Portfolio development – used to support reflection and action planning. PDP activity must cover: • Graduate skills • Specific career competencies • Personal attitudes and attributes through the development of technical and professional knowledge. Include a mechanism for capturing PDP e.g. learning log, e-portfolio.	Whitlock (2005) Higher-level personnel interviews
WBL	Consider how the five key themes of a WBL curriculum can be implemented and evidenced: 1. Relevance of the curriculum in meeting student/employer needs using work-based activities to facilitate learning. 2. The curriculum needs to be flexible to recognise individual needs through an individual learning plan. 3. The learning experience is key to achieving student/employer satisfaction. 4. The learners starting point with regard to current competencies should be examined.	Boud and Solomon (2001); Margaryan, (2008); Raelin (2008)

	5. Learning outcomes are important in a WBL course. Use WBL to link theory, practice and again theory together. Consider how the workplace can be used as an environment for learning. Consider how any of the information in the four models of WBL could apply to a full-time and part-time construction management course. Include evidence of reflective practices. Consider how COBE's generic course framework could apply to a full-time and part-time construction management course. True WBL to take place as negotiated activity set within a workplace with employer involvement in the assessment. Use a 'pick and mix' skill escalator approach for capturing WBL. Consider using different types of WBL modules for full and part-time students. Full-time students could use 'affirmative' modules and part-time students may be able to use 'transformative' modules. As soon as a student begins a construction course, establish the professional body (RICS/CIOB/ICE/RIBA/CIAT) they wish to join and drive the WBL from the Professional Body competencies. Establish a clear connection between education and work.	Raelin (2008) Burns and Chisholm (2003) Schön (1983) COBE (2006) Corkill (2006) Hatfield (2006) Brown and Harte (2006) Pathway leader questionnaire
Skill development	Use progress files. Integrate skill development with personal and career planning. Use a portfolio of evidence to capture and record skill development. Ensure career management and entrepreneurial and business skills are covered.	Whitlock (2005) Clegg and Bradley (2005) Student

	Do not teach employability skills as stand-alone subjects but embed these important skills in the curriculum around professionalism and ethics. Ensure there is mechanisms in the curriculum to check what should be covered are being covered. Develop skills such as reflection, strategic thinking, self-direction and self-evaluation.	questionnaire Higher-level personnel interviews Student questionnaire
Professional competence	Implementation of the 'super suite of employability skills and competencies' into the student's course. Introduce the professional body. Embrace the concept of 'reflecting-in-action' and 'reflecting-on-action' to modify behaviour. Ensure feedback about performance takes place as it occurs, as this will enhance capability. Provide a strong overall emphasis on understanding and applying skills relevant to all components of the whole construction project lifecycle and process.	Focus group Higher Education Better Regulation Group (2011) Schön (1983) Fraser and Greenhalgh (2001) Edwards (2009)

Appendix 7.18: Draft model showing the knowledge and skill activity within the BSc (Hons) Construction Management course

Qualification Descriptors (QAA, 2012b UK Quality Code for Higher Education)	**Technical and Professional Knowledge**	**Graduate Skills**	**Activity integrating PDP and WBL to enhance traditional academic theory**
Level 6 • a systematic understanding of key aspects of their field of study, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of defined aspects of a discipline • an ability to deploy accurately established techniques of analysis and enquiry within a discipline • conceptual understanding that enables the student: ➢ to devise and sustain arguments, and/or to solve problems, using ideas and techniques, some of which are at the forefront of a discipline ➢ to describe and comment upon particular aspects of	Built environment Business management Construction technology Data and information management Entrepreneurial and business skills (commercial awareness) Financial management Health and safety Leadership Management Monitoring and controlling Planning and organising Professionalism, values and ethics Strategic management Sustainability	Analysis Assimilate, memorise and recall Communication Decision making Developing and Executing Research Improving ones own performance Inter-personal skills Literacy skills Numeracy skills Problem solving Quantitative methods Questioning Teamwork Time management Working with others (groups)	***Learning log*** • Completion record of knowledge gained, skill development and specific career competencies achieved with evidence of critical reflection • Becoming a full member of a professional body • Further study • CPD activity ***Study skills*** • Creative thinking • Enhancement of reflective skills • Extending research skills • Strategic thinking ***WBL*** • Employer/placement induction checklist • Work placement learning agreement • Risk assessment

current research, or equivalent advanced scholarship, in the discipline • an appreciation of the uncertainty, ambiguity and limits of knowledge • the ability to manage their own learning, and to make use of scholarly reviews and primary sources (for example, refereed research articles and/or original materials appropriate to the discipline).			• Evidence of how personal/professional knowledge and skills is applied in the workplace • Skills design and development • Employer engagement • Evaluation of WBL experience ***Personal tutoring*** • Individual and group tutorials • Progress management and exit planning
Level 5 • knowledge and critical understanding of the well established principles of their area(s) of study, and of the way in which those principles have developed • ability to apply underlying concepts and principles outside the context in which they were first studied, including, where appropriate, the application of those principles in an employment context • knowledge of the main methods of enquiry in the	Auditing systems Built environment Business management Construction related computer applications Construction technology Contracts (administration and law) Data and information management Disputes Financial management Health and safety Law Leadership Management Measurement	Analysis Communication Data handling Decision making Developing and Executing Research Developing people and teams IT literate Literacy skills Numeracy skills Problem solving Quantitative methods Questioning Working with others (groups)	***Learning log*** • Evaluation of each semester's performance • Year two reflection • Personal profile (skills, abilities and personal qualities) ***Study skills*** • Choosing a job • Placement opportunities (employment fair) • CV, application form and letter writing • Interview techniques • Research skills covering ethics, literature and database searches and quantitative

subject(s) relevant to the named award, and ability to evaluate critically the appropriateness of different approaches to solving problems in the field of study • an understanding of the limits of their knowledge, and how this influences analyses and interpretations based on that knowledge.	Monitoring and controlling Negotiation Procurement Planning and organising Professionalism, values and ethics Scientific principles related to construction Sustainability		methods • Problem solving • Working as a team and developing people skills ***Personal tutoring*** • Individual and group tutorials • Progress management
Level 4 • knowledge of the underlying concepts and principles associated with their area(s) of study, and an ability to evaluate and interpret these within the context of that area of study • an ability to present, evaluate and interpret qualitative and quantitative data, in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of their subject(s) of study.	Auditing systems Built environment Construction site practice Construction technology Data and information management Economics Health and safety Law Management Scientific principles related to construction Sustainability Surveying	Analysis Assimilate, memorise and recall Communication Data handling Improving ones one performance IT literate Learning strategies and study techniques Literacy skills Numeracy skills Questioning Teamwork Time management	***Learning log*** • Identification of current knowledge and skill base • PDP priorities and goal setting • What will success look like • Evaluation of each semester's performance • Year one reflection ***Study skills*** • Becoming an independent learner • Essay writing • Information retrieval • IT skill development • Literature searches • Library skills • Mind maps • Note taking • Report writing • Reflective skills

			• Presentation skills • Time management ***Personal tutoring*** • Individual and group tutorials • Progress management
Welcome Week/Induction	Introduction to the course, modules and personal tutoring The learning log		***Study skills*** • Devil's guide to learning • Learning styles • Becoming a professional (student membership) • Improving your listening skills • How to work in groups

Appendix 7.19: Mapping of the new BSc (Hons) Construction Management course against the researchers five key themes

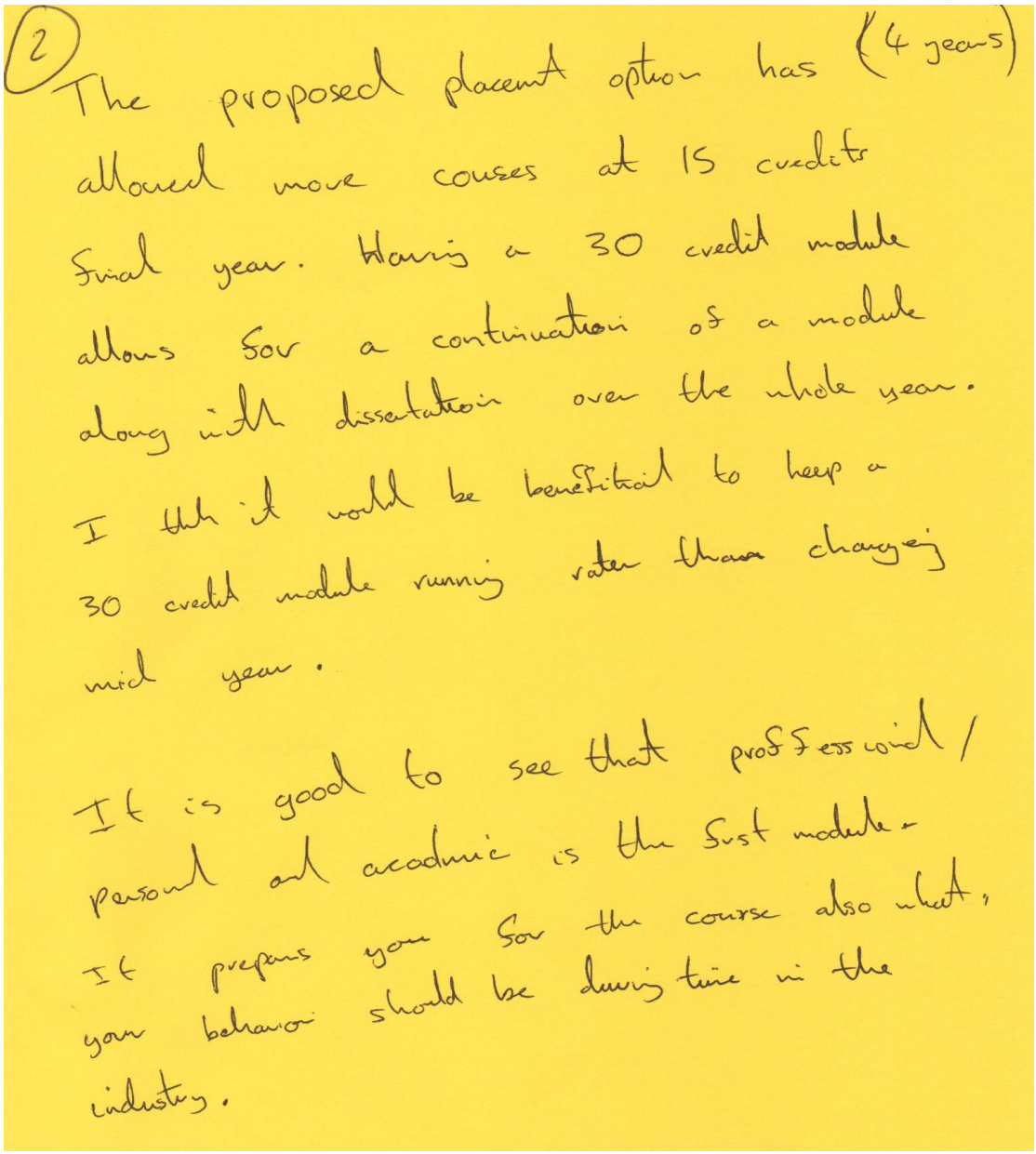
Key theme	BSc Construction Management course
Relevance of the curriculum in meeting student/employer needs using work-based activities to facilitate learning.	The qualification strongly reflects employer needs and is accessible to full and part time students who wish to extend their studies into higher education. The course is a combination of academic study and a work-based module through which students demonstrate, using work-based evidence how personal/professional knowledge and skills are applied in professional practice. The learner is invited to apply their learning and challenge the procedures and practices of their employer/placement. Ensuring these strong links between learning and employment will maintain the currency of content and the relevance of the skills developed. Employer and student feedback is vital to ensure the qualification continues to meet the purpose for which it was designed. As regulations and ideas change, the curriculum will be updated through the curriculum revisions and re-validation process at the university.
The curriculum needs to be flexible to recognise individual needs through an individual learning plan.	The course illustrates the point well with students producing a learning log and an individual career plan as part of a Graduate Skills Framework for Construction Management. When students undertake a work placement a tri-partite agreement will exist between Anglia Ruskin University, as the education provider, the student and the employer. An academic member of staff at the university will be responsible for monitoring

	and supporting the student's progress at their workplace. Putting the learners at the heart of the course with individual support through the personal tutoring system emphasises Boud and Solomon's (2001) second characteristic of WBL.
The learning experience is key to achieving student/employer satisfaction.	Students who study the BSc Construction Management course will undertake 120 credits of study/year as full time students and between 60 – 90 credits as part time day release students. The 'Negotiated Workplace Learning' module allows students to recognise the application of academic theory in workplace activities and to reflect on the work at university whist undertaking their workplace assessment. The assessment tasks in the above module are organisation specific and this means that the students' learning is very much contextualised in their own work practices. Students are provided with the following support during their studies: • Pastoral support through a personal tutor. • General academic support through module tutors and a course leader. • Learning support, in particular facilitating learning in the workplace. • A visit to the workplace during the 'Negotiated Workplace Learning' module.

The learners starting point with regard to current competencies should be examined.	Students wishing to undertake the BSc Construction Management course are likely to have either attended a sixth form at school or college and achieved 'A' levels, or undertook a national vocational award e.g. National Diploma, or have worked in the construction industry for a number of years and come from a trade background. The student's current competence and knowledge will be established in relation to the course content together with their UCAS tariff. The use of Accreditation for Prior Certificated Learning (APCL) or Accreditation for Prior Experiential Learning (APEL) can be used to give students credit for their prior certificated knowledge or competence in the workplace.
Learning outcomes are important in a WBL course.	Each of the modules on the BSc Construction Management course have appropriate learning outcomes which give an indication of what a student must do to satisfy the requirements of the module. Within the module 'Personal, Professional and Academic Development' students will: • Demonstrate an understanding of the key graduate skills required to support learning in HE, the workplace and in becoming a professional. • Use a range of investigative skills and techniques in a defined context and utilise information relevant to their chosen area. • Actively examine their own learning by taking a more active role in it and prepare a learning log including an outline personal development plan.

Appendix 7.20: Focus Group Feedback

Example of the coloured sheet feedback from focus group 1



(2)

The proposed placement option has (4 years) allowed more courses at 15 credits final year. Having a 30 credit module allows for a continuation of a module along with dissertation over the whole year. I think it would be beneficial to keep a 30 credit module running rather than changing mid year.

It is good to see that professional / personal and academic is the first module - It prepares you for the course also what your behaviour should be during time in the industry.

Appendix 7.21: Identification of key themes from the Focus Groups

Area	Focus Group 1	Focus Group 2	Key Themes (implicit and/or explicit)
Final draft super suite of employability skills and competencies	• Favouring personal attitudes and attributes as column 1. • Should cover soft skills at university and look at professional skills, which the super suite addresses. • Course should cover the roles of the professions and the potential opportunities in industry. • Super suite of employability skills and competencies - agree the course will cover more due to being more specific. • The four sections (columns) work well. • Good to be able to get out on site. • A positive attitude and good behavior is key. • Questioning and communication are so important as is developing relationships. • Missing from the list are project management, courage and relationships. • Not sure about the inclusion of visionary.	• The heading 'personal attributes' might be less subjective if employers refer to employees' individual personalities as opposed to their attitude in an interview. • Some items can be ambiguous as they may come under more than one heading and some items have different levels and so may be applicable to different headings at different levels e.g. discussion of visionary. • Too much information such as technical and professional has a lot of competencies to be achieved. • Difficult to develop something such as visionary. • Should add something on equality of opportunity. • Each heading is to the point and focuses on the good points and each list covers a good range of aspects.	Soft skills Relationships Attitude and behaviour Individual personalities Level of competence Equality of opportunity
Course structure diagrams	• The proposed placement option has allowed more modules of 15 credits in the final year. • Having a 30 credit research module	• Good to have developing and executing research module but if it is too soon in the course students feel it is too remote from their dissertation.	Soft skills Order and content of modules Module size

	(level 5) allows for the continuation of research skills to extend to the major project (level 6) over the whole. • 30 credit modules should run all year. • It's good to see that professional, personal and academic skills is the first module which prepares you for the course in addition to what your behaviour should be like in industry. • Surveying should be retitled Site Engineering Surveying. • Placement year is crucial. • Soft skills should encourage reflection of the situation before making rash judgements. • Would recommend pairing full-time students with part-time students when undertaking group activity.	• Basic CAD would be essential but not to the extent of that needed for becoming an architect. • Construction planning and programming should be in the semester following building resource management. • Modules seem fairly split up over the semesters. • Some modules may be better being introduced in semester two rather than semester one. • What's gone in is quite sensible however what has come out to make space and students do prefer the core modules. • 15 credits for a module is too much and does not allow for major changes. • Project management should be taught earlier and perhaps taught alongside construction planning and programming. • Since the module site and engineering surveying has gone, some content will need to be included in the surveying module. • Need to include more numeracy content. • I feel the proposed modules are indeed better than the existing as they relate more to construction management in the workplace. • SketchUp is not 2D.	Improved module relevance

Model of knowledge and skill activity	• Level 4 modules may not count towards the final grade but I found it to be where I developed as a person the most. • At this level I found it to be key in deciding on my career path. • The model should focus on the person and their development, prepare students for employment – in the main it does this. • Need to show what attitude and attributes are needed through university to a professional career. • Welcome week introduce professional profiles of various roles linked to key attributes needed in the roles which link to daily responsibilities so students can assess and focus on their own personal path to employment. • Learning log works with part time as a document of thoughts and items learnt outside of University teachings. • Learning log is more like a journal and I think it's best to identify different learning skills, which could help develop an individual so they could learn to sell this part of themselves in an interview. • Students need to be encouraged to recognise their own transferable assets. • Establish and apply their personal template for success. • Demonstrate attitude and behaviour in	• Like the idea of a learning log to enable further progression to chartered status. • Like starting the process to chartered status from the beginning of university. • Very informative and useful for students to refer to during their course. • If students are asked to take their reports to their personal tutor it should be made compulsory otherwise students will be unlikely to attend as there is no point. • The learning log should be on-line. • Should CIOB have an online resource for logging some technical and professional knowledge? • Engagement is important when lecturing students and smaller classes will benefit this.	Own transferrable assets Personal template Learning log (optional or compulsory) – delivered on-line

	the learning log. • All four final super suite of employability skills and competencies should be included.		
Skills and competencies matrix	• The colour coding works well. • Personal attitudes and attributes are assessed after application at interview. • The headings need further explanation as to why each of the four areas are covered. • The information is presented clearly, easy to understand, and focus on. • It would be useful to show how the skills are applicable to a profession e.g. construction manager.	• Introduce a checklist that is signed off by the tutor for each student as each skill is developed during that module. • Responsibility - as a graduate what level of responsibility do you accept? • Good layout and easy to understand, very useful colour-coded key • Easy to read to see credits involved understand. • Good way of noting technical and professional knowledge and will be very useful to students when completing assignments. • Are the skills developed or assessed or both? • Good stuff and easy to understand but does it all have to be assessed? If yes, is it right to put it all in one box?	Colour coding Presentation Clarity Application of skills Checklist Level Assessment of skills
Links between the modules	• The presentation could be improved by putting the table into a flowchart as it feels a little disjointed. • Show students when their previous experience will be useful in further modules to ensure the information is easy to get hold of.	• Would prefer the modules linked to the construction management roles and show all the skills a construction manager needs to know. • Good to know what modules are linked together. • Good use of colour to identify between headings and a good way of displaying the links for modules. • Not sure about the diagram, could have more links.	Presentation Colour coding

Module Definition Forms (MDFs) for the eight new modules	• Need to explain some of the headings that are used on the MDFs e.g. item 7 and the explanation could go in the module content. • Need to ensure assessments opportunities allow freedom of expression, which can be done through the learning log. • Use a student management plan. • Well structured, very clear and informative and gives a good outline of each module – would be happy to receive this form.	• Difficult to say if these forms are effective in the time given to review them. • Including the learning log information on the MDF is a good idea. • Use a different colour for key text literature. • Additional colour would be useful e.g. links to the construction model (box 6b). • Could produce a skills matrix for each module.	Clarity Student management plan Colour coding Presentation
Mapping of modules to the CIOB Education Framework	• Improve the presentation by colour code the headings and separate the years using a space or thicker line.	• Could this area be developed into the information in section 5? • Easy to read and understand the areas that will be covered. • This is important as it shows what you need for CIOB. • Good to know how the course is set out between full and part-time study. • Use of colour will make it attractive and useful to students.	Presentation Colour coding

Appendix 7.22: Collation of key themes from the Focus Groups

Key Themes (implicit and/or explicit)
Application of skills
Assessment of skills
Attitude and behaviour
Checklist
Clarity
Colour coding
Equality of opportunity
Improved module relevance
Individual personalities
Learning log (optional or compulsory) – delivered on-line
Level
Level of competence
Module size
Order and content of modules
Own transferrable assets
Personal template
Presentation
Relationships
Soft skills
Student management plan

Appendix 7.23: Outline for a Graduate Skills Framework for Construction Management

What is a Graduate Skills Framework for Construction Management?

The Graduate Skills Framework for Construction Management is a holistic approach to your studies through which you develop and record a broad range of skills and experiences whilst undertaking your degree. It contains a number of elements:

- Academic study
- Learning log
- Skills audit
- Personal tutoring
- Career planning

The Graduate Skills Framework for Construction Management is embedded in your studies and is seen as an integral part of your development from new student through to graduate and ultimately onto becoming a professional. To succeed at University, you need to develop appropriate study skills; to gain employment and/or seek promotion at work you need to display employability skills and to become professional in the construction industry you need to demonstrate proficiency in specific career competencies whilst exhibiting positive personal attitudes and attributes. Your Graduate Skills Framework for Construction Management will help you plan your personal and professional development to ensure you (and your employer) get the most out of the University experience.

Once you have completed your Graduate Skills Framework for Construction Management it provides evidence of your academic ability and suitability for employment and/or career enhancement. This record is invaluable when applying for jobs, seeking promotion and developing your career to become a chartered professional. The Chartered Institute of Building (CIOB) Professional Review specifically requests that candidates identify:

- Their training and development which includes a personal development plan
- Their knowledge and its application through a competence report, and
- Their commitment to professionalism.

How it works?

The five elements have been developed to ensure that you have access to the best possible learning experience and employment opportunities, in the future. Table 1 illustrates the Final Super Suite of Skills and Competencies. The relationship between knowledge and skill achievement on your course is shown in Appendix 1.

Table 1 – Final super suite of employability skills and competencies

Personal Attitudes and Attributes (Expectations of a Professional)	Technical and Professional Knowledge (Subject Specific)	Graduate Skills (Academic and Employment)	Specific Career Competencies (Based on the CIOB (2014a) Professional Development Programme and the CIOB (2013b) Professional Review)
1. Adaptability 2. Assertiveness 3. Attention to detail 4. Autonomy 5. Can do approach 6. Common-sense 7. Courage 8. Creative and imaginative thinking 9. Decisiveness 10. Forward thinking 11. Initiative 12. Integrity 13. Intuition 14. Open-mindedness 15. Positive attitude 16. Presentable 17. Professional 18. Reflectiveness 19. Respect 20. Responsibility 21. Self-motivation 22. Sensitivity 23. Visionary	1. Built environment 2. Business management 3. Contracts (administration and law) 4. Construction related computer applications 5. Construction technology 6. Data and information management 7. Disputes 8. Economics 9. Entrepreneurial and business skills (commercial awareness) 10. Financial management 11. Health and safety 12. Law 13. Leadership 14. Management 15. Monitoring and controlling 16. Negotiation 17. Planning and organising 18. Procurement 19. Professionalism, values and ethics 20. Project management 21. Scientific principles related to construction 22. Strategic management 23. Surveying 24. Sustainability	1. Analysis 2. Assimilate, memorise and recall 3. Communication 4. Data handling 5. Decision making 6. Developing and executing research 7. Improving ones own performance 8. Inter-personal skills 9. IT literate 10. Judgements 11. Learning strategies and study techniques 12. Literacy skills 13. Numeracy skills 14. Problem solving 15. Quantitative methods 16. Questioning 17. Relationships 18. Teamwork 19. Time management 20. Working with others (groups)	1. Commitment to code of ethics 2. Commitment to CPD 3. Communication 4. Decision making 5. Developing people or teams 6. Implementing sustainable construction and development 7. Innovation 8. Knowledge of commercial, contractual and legal issues 9. Leadership and strategic/ financial management 10. Managing information 11. Managing health and safety 12. Managing quality 13. Personal effectiveness at work 14. Planning and organising work 15. Professional judgement and responsibility

Appendix 2 identifies the modules in the form of a structure diagram (full and part-time study), Appendix 3 indicates how each of these modules fits into the overall course structure through the knowledge, skills, competencies, attitudes and attributes matrix, Appendix 4 shows the links between each of the modules and Appendix 5 shows the mapping of modules to the CIOB Education Framework.

There are four stages to the Graduate Skills Framework for Construction Management whilst at University and a final fifth stage following graduation that you can develop en-route to becoming a professional.

Stage one – Welcome Week/Induction

Students are introduced to life at university and will attend the centrally organized events. During the time spent within the Department of Engineering and the Built Environment, students will have an introduction to the course and the modules, and the University's personal tutoring system. Bespoke study skill sessions will introduce the student to the Graduate Skills Framework for Construction Management and students will start their learning log.

What is a learning log?

A learning log is a record of your own learning. It is a personal document and helps you record, structure, think about and reflect upon, plan, develop and evidence your own learning. It is not just a record of what you have done or achieved but it allows you to critically reflect on what you have learnt, tried, succeeded in and been unsuccessful at. The learning log is a tool to aid self-reflection, thus developing a useful personal attribute of becoming a professional. There is no one framework used for a learning log, however making sure it does what it says 'on the tin' is an important concept. To aid the development of your learning log, the following headings may be useful:

- What was the learning event?
- What did you learn?
- What does this learning mean to you?
- What will you do next?

Alternatively, following an activity, piece of work or module, you could try answering the following questions:

- Did it work out as planned?
- What was the most successful part of the activity, piece of work or module?
- Will you consider using a similar approach in the future?
- What would you do differently next time?

Stage two – Level 4 modules

In the first semester of your first year you will undertake the module 'Personal, Professional and Academic Development'. This module introduces you to the development of graduate skills. Study skills will enhance your learning and you will develop your learning log through a personal development plan. The knowledge and skills learnt in this module will support learning in other modules during your course. At the end of each semester you will be expected to evaluate your performance and at the end of the year, reflect on the knowledge gained, identify your development needs and update your personal development plan through your learning log. See Appendix 6 for a copy of the yearly review template, which will be monitored in the personal tutoring sessions. The themes of building technology, the environment and management are introduced. Students are exposed to the importance of health and safety and other forms of law and legislation and students undertake a specialist study in economics.

Stage three – Level 5 modules

Students develop their management skills, expand their knowledge of building construction and engage further with sustainability. Specialist modules in measurement, contracts and pricing are introduced and students extend their planning and programming knowledge and skills. In preparation for their final year project and the option of a placement year for full-time students, the module 'Developing and Executing Research is studied in the second semester. Students will gain knowledge on how to undertake a research project and how to put together a research proposal. The importance of ethics in research is introduced. Students will also develop their CV, application form, letter writing and interview skills. Full time students will apply for a placement opportunity and will attend the Employment Fair. Finally, students will update their learning log and produce a personal profile of skills, abilities and personal qualities.

Stage four – Level 6 modules

Full-time students will undertake a placement period between their second and third years. The placement period will follow the guidelines laid down in the FST Work Placement Handbook. Both full and part-time students will take the 'Negotiated Workplace Learning' module. Students will carryout a reflective analysis of their work and demonstrate how their work-based evidence in personal/professional knowledge and skills is applied in professional practice.

The management, construction technology and environmental sustainability themes continue at this level. Students explore in detail values and ethics relevant to the built environment professional. Within the management theme students explore performance management systems and identify the benefits of an appraisal system. As a final year student, the workload culminates with a research project. Students build on their research proposal and investigate a subject, issue or problem to a usable outcome through critical and independent thinking.

Students finalize their learning log by producing a CV and exit plan and link this to their future professional and CPD activity. The personal tutoring sessions continue to monitor this work.

Stage five – After leaving university

Students should have all the necessary knowledge and skills to either gain employment in the construction industry or show career development in their current role. Students will be working towards professional membership of the CIOB and will use their learning log to enhance the process.

Appendix 1 Knowledge and skill activity within the BSc (Hons) Construction Management course

Qualification Descriptors (QAA UK Quality Code for Higher Education, 2012)	**Personal Attitudes and Attributes**	**Technical and Professional Knowledge**	**Graduate Skills**	**Specific Career Competencies**	**Activity integrating PDP and WBL to enhance traditional academic theory**
Level 6 • a systematic understanding of key aspects of their field of study, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of defined aspects of a discipline • an ability to deploy accurately established techniques of analysis and enquiry within a discipline • conceptual understanding that enables the student: ➢ to devise and sustain arguments, and/or to solve problems, using ideas and techniques, some of which are at the forefront of a discipline ➢ to describe and comment upon particular aspects of current research, or equivalent advanced scholarship, in the	Adaptability Autonomy Can do approach Common sense Initiative Courage Creative and imaginative thinking Open-mindedness Positive attitude Presentable Professional Reflectiveness Relationships Respect Responsibility Self motivation Sensitivity Visionary	Built environment Business management Construction technology Data and information management Entrepreneurial and business skills (commercial awareness) Financial management Health and safety Leadership Management Monitoring and controlling Planning and organising Professionalism, values and ethics Project management	Analysis Assimilate, memorise and recall Communication Decision making Developing and Executing Research Improving ones own performance Inter-personal skills Literacy skills Numeracy skills Problem solving Quantitative methods Questioning Teamwork Time management Working with others (groups)	Commitment to code of ethics Commitment to CPD Communication Decision making Developing people or teams Implementing sustainable construction and development Innovation Personal effectiveness at work Professional judgement and responsibility	***Learning log*** • Completion record of knowledge gained, skill development and specific career competencies achieved with evidence of critical reflection • Becoming a full member of a professional body • Further study • CPD activity ***Study skills*** • Creative thinking • Enhancement of reflective skills • Extending research skills • Strategic thinking ***WBL*** • Employer/placement induction checklist • Work placement learning agreement • Risk assessment • Evidence of how personal/professional knowledge and skills is applied in the workplace • Skills design and development • Employer engagement • Evaluation of WBL experience

discipline • an appreciation of the uncertainty, ambiguity and limits of knowledge • the ability to manage their own learning, and to make use of scholarly reviews and primary sources (for example, refereed research articles and/or original materials appropriate to the discipline).		Strategic management Sustainability			***Personal tutoring*** • Individual and group tutorials • Progress management and exit planning
Level 5 • knowledge and critical understanding of the well established principles of their area(s) of study, and of the way in which those principles have developed • ability to apply underlying concepts and principles outside the context in which they were first studied, including, where appropriate, the application of those principles in an employment context • knowledge of the main methods of enquiry in the subject(s) relevant to the named award, and ability to evaluate critically the appropriateness of different approaches to solving problems in the field of	Attention to detail Decisiveness Forward thinking Intuition Reflectiveness	Auditing systems Built environment Business management Construction related computer applications Construction technology Contracts (administration and law) Data and information management Disputes Financial management Health and safety Law Leadership	Analysis Communication Data handling Decision making Developing and Executing Research Developing people and teams IT literate Literacy skills Numeracy skills Problem solving Quantitative methods Questioning Working with others (groups)	Communication Decision making Knowledge of commercial, contractual and legal issues Leadership and strategic/financial management Managing quality Planning and organising work	***Learning log*** • Evaluation of each semester's performance • Year two reflection • Personal profile (skills, abilities and personal qualities) ***Study skills*** • Choosing a job • Placement opportunities (employment fair) • CV, application form and letter writing • Interview techniques • Research skills covering ethics, literature and database searches and quantitative methods • Problem solving • Working as a team and developing people skills ***Personal tutoring*** • Individual and group tutorials • Progress management

study • an understanding of the limits of their knowledge, and how this influences analyses and interpretations based on that knowledge.		Management Measurement Monitoring and controlling Negotiation Procurement Planning and organising Professionalism, values and ethics Scientific principles related to construction Sustainability			
Level 4 • knowledge of the underlying concepts and principles associated with their area(s) of study, and an ability to evaluate and interpret these within the context of that area of study • an ability to present, evaluate and interpret qualitative and quantitative data, in order to develop lines of argument and make sound judgements in accordance with basic theories and concepts of their subject(s) of study.	Can do approach Forward thinking Positive attitude Professional Reflectiveness Responsibility Self motivation	Auditing systems Built environment Construction site practice Construction technology Data and information management Economics Health and safety Law Management Scientific principles related to construction Sustainability Surveying	Analysis Assimilate, memorise and recall Communication Data handling Improving ones one performance IT literate Learning strategies and study techniques Literacy skills Numeracy skills Questioning Teamwork	Commitment to CPD Communication Managing heath and safety	***Learning log*** • Identification of current knowledge and skill base • PDP priorities and goal setting • What will success look like • Evaluation of each semester's performance • Year one reflection ***Study skills*** • Becoming an independent learner • Essay writing • Information retrieval • IT skill development • Literature searches • Library skills • Mind maps • Note taking • Report writing

			Time management		• Reflective skills • Presentation skills • Time management ***Personal tutoring*** • Individual and group tutorials • Progress management
Welcome Week/Induction		Introduction to the course, modules and personal tutoring The learning log			***Study skills*** • Devil's guide to learning • Learning styles • Becoming a professional (student membership) • Improving your listening skills • How to work in groups

Appendix 2 BSc (Hons) Construction Management (4 years placement option) [Proposed]

Year	Semester 1	Semester 2
1	MOD00XXXX: Personal, Professional and Academic Development (C) [15, L4] MOD00XXXX: Surveying (C) [15, L4] MOD002255: The Built Environment Work Sector (C) [15, L4] MOD002250: Introduction to Civil Law and Legislation (C) [15, L4]	MOD002262: An Introduction to Technology and Design (C) [30, L4] MOD002256: Construction Economics (C) [15, L4] MOD002251: Site Management and Safety (C) [15, L4]
2	MOD00XXXX: Building Resource Management (C) [15, L5] MOD002290: Project and Contracts Administration (C) [15, L5] MOD003712: Measurement (C) [15, L5] MOD002277: Construction Planning and Programming (C) [15, L5]	MOD002319: Environmental Services and Construction Technology (C) [30, L5] MOD003713: Analysis and Control of Production Costs (C) [15, L5] MOD00XXXX: Developing and Executing Research (C) [15, L5]
3	Placement Year MOD00XXXX: Negotiated Workplace Learning (O) [15, L6]	
4	MOD002358: Project Evaluation and Development (O) [15, L6] MOD002338: Construction Technology and Innovation (C) [15, L6] MOD00XXXX: Construction Business Strategy (C) [15, L6]	MOD002359: Project Management (C) [15, L6] MOD002344: Environmental Management (C) [15, L6] MOD00XXXX: Professional Studies (C) [15, L5]
	MOD00XXXX: The Research Project (C) [30, L6]	

Key: New modules

BSc (Hons) Construction Management (5 years part time) [Proposed]

Year	Semester 1	Semester 2
1	MOD00XXXX: Personal, Professional and Academic Development (C) [15, L4] MOD00XXXX: Surveying (C) [15, L4]	MOD002262: An Introduction to Technology and Design (C) [30, L4]
2	MOD002255: The Built Environment Work Sector (C) [15, L4] MOD002250: Introduction to Civil Law and Legislation (C) [15, L4]	MOD002256: Construction Economics (C) [15, L4] MOD002251: Site Management and Safety (C) [15, L4]
3	MOD00XXXX: Building Resource Management (C) [15, L5] MOD002277: Construction Planning and Programming (C) [15, L5]	MOD002319: Environmental Services and Construction Technology (C) [30, L5] MOD003713: Analysis and Control of Production Costs (C) [15, L5]
4	MOD002290: Project and Contracts Administration (C) [15, L5] MOD003712: Measurement (C) [15, L5]	MOD00XXXX: Developing and Executing Research (C) [15, L5] MOD00XXXX: Negotiated Workplace Learning (O)* [15, L6] MOD002344: Environmental Management (C) [15, L6]
5	MOD002338: Construction Technology and Innovation (C) [15, L6] MOD00XXXX: Construction Business Strategy (C) [15, L6]	MOD002359: Project Management (C) [15, L6] MOD00XXXX: Professional Studies (C) [15, L5]
	MOD00XXXX: The Research Project (C) [30, L6]	

Key: New modules *Optional module but compulsory for part time students

Appendix 3 Knowledge, skills, competencies, attitudes and attributes matrix

Key:

Technical and professional knowledge – the subject knowledge related to the course content
Graduate skills – range of skills that help students with their study and employment prospects
Specific career competencies – Based on the CIOB Professional Development Programme and the CIOB Professional Review competencies needed for Chartered Membership
Personal attitudes and attributes – Expectations (behaviour and characteristics) of a Professional working in practice

Module	Level	Credits	Learning outcomes	Technical and professional knowledge, Graduate skills, Specific career competencies, and Personal attitudes and attributes developed
Personal, Professional and Academic Development	4	15	1. Demonstrate an understanding of the key graduate skills required to support learning in HE, the workplace and in becoming a professional. 2. Use a range of investigative skills and techniques in a defined context and utilise information relevant to their chosen area. 3. Actively examine their own learning by taking a more active role in it and prepare a learning log including an outline personal development plan. 4. Use standard software packages for word processing, literature search, data analysis and communication to identify, locate, summarise and utilise information relevant to their chosen area.	Built environment Data and information management Communication Data handling Improving ones one performance IT literate Learning strategies and study techniques Literacy skills Questioning Time management Commitment to CPD Communication Can do approach Forward thinking Positive attitude Reflectiveness Responsibility Self motivation
Surveying	4	15	1. Demonstrate a basic knowledge and understanding of surveying instruments and equipment. 2. Undertake basic site measurement using	Construction technology Surveying Numeracy skills Teamwork

			linear and vertical detailing techniques and present raw survey data/associated calculations in a recognised format. 3. Analyse acquired data for the preparation of plans and subsequent setting out data, selecting and applying appropriate calculation methods.	
The Built Environment Work Sector	4	15	1. Identify the differing areas within the built environment and outline opportunities for employment and career progression. 2. Analyse the role of land and building in society and the manner of its historic and modern development and be aware of and realise the implications of the growth of statutory contracts over land use and development over the past 150 years. 3. Analyse the structure of the building and development industry and know the roles and positions of the various professional principles and professional parties in the development process. 4. Identify the role of the professional in society and indicate specific career competencies needed in their chosen area.	Built environment Health and safety Sustainability Analysis Communication Communication Professional
Introduction to Civil Law and Legislation	4	15	1. Demonstrate an understanding of the English legal system and its sources. 2. Have an understanding of the process of civil law. 3. Understand the key basic principles of the law of contract and tort. 4. Study and research legal material in hard copy and electronic form.	Health and safety Law Assimilate, memorise and recall

Construction Economics	4	15	1. Be aware of basic microeconomic and macroeconomic theory and apply this to the context of the built environment. 2. Recognise the importance of current economic issues and demonstrate how they impact on firms in the built environment. 3. Apply knowledge to particular economic strategies.	Built environment Economics Assimilate, memorise and recall
Site Management and Safety	4	15	1. Develop an understanding of the principles of management, the work of pioneers and founders of management, their evolution and application to modern day practice. 2. Demonstrate a general awareness of health and safety law applicable to the construction industry. 3. Undertake risk assessments associated with the hazards in the context of site management and demonstrate how the risks are managed by the development and implementation of a safety method statement, which will ensure a safe system of working on site.	Auditing systems Construction site practice Health and safety Management Sustainability Communication Communication Managing heath and safety
An Introduction to Technology and Design	4	30	1. Have a broad knowledge of how past and present houses are constructed to resist the elements and accommodate their intended use and how services installations contribute to user comfort. 2. Explain the primary functional requirements of the main elements of domestic construction and how the typical materials can achieve these as well as the factors that lead to their	Construction technology Health and safety Scientific principles related to construction Communication Numeracy skills Teamwork Communication

			deterioration 3. Identify many of the hazards encountered on a typical construction site and demonstrate a general awareness of health and safety legislation applicable to the construction industry 4. Demonstrate knowledge and understanding, in principle, to structural behaviour and make links between structural materials, structural applications and health and safety. 5. Write a formal report including the use of simple annotated sketches and scale drawings. 6. Apply scientific principles to construction problems and tackle and solve structural calculations.	
Building Resource Management	5	15	1. Apply and evaluate current management thinking to practical and safe resource problems in a construction context clearly encompassing health and safety issues. 2. Identify and deploy resources to suit business and project situations. 3. Relate the many and diverse organisational theories that have been developed to the everyday practical reality of building operations.	Auditing systems Business management Health and safety Leadership Management Negotiation Sustainability Decision making Developing people and teams Problem solving Working with others (groups) Decision making Leadership and strategic/financial management Managing quality Decisiveness
Project and Contracts Administration	5	15	1. Analyse common contractual problems, evaluate the evidence and propose	Contracts (administration and law) Disputes

			solutions. 2. Select and apply methods of managing and administering building contracts during the post contract stage up to final account. 3. Demonstrate a working knowledge of the legal principles, which govern building contracts and show how they affect contract practice and financial settlement. 4. Select professional and ethical approaches to management of contracts.	Law Procurement Analysis Knowledge of commercial, contractual and legal issues
Measurement	5	15	1. Understand the role of quantification and information in the development process. 2. Understand the measurement and information rules and requirements for construction work. 3. Select and apply appropriate methods of measurement to various types of construction work and stages of a project. 4. Interpret drawn and written information.	Built environment Construction related computer applications Measurement Numeracy skills
Construction Planning and Programming	5	15	1. Develop a sequence for a construction project and produce a programme using industry standard project planning software. 2. Understand and apply different methods of analysing delays to projects. 3. Produce technical reports on programmes produced using project planning software.	Construction related computer applications Monitoring and controlling Planning and organising Communication Decision making IT literate Communication Decision making Planning and organising work Attention to detail
Analysis and Control of Production Costs	5	15	1. Demonstrate the relevant processes to produce cost estimates for construction works based on a variety of information.	Financial management Numeracy skills Attention to detail

			2. Recognise the factors that influence the costs/price of new building work and repair and maintenance, work along with an understanding of the sources of cost data for both, and an appreciation of the risk and commercial factors in construction works. 3. Understand the potential and use of Building Information Modelling (BIM). 4. Interpret construction cost information.	
Developing and Executing Research	5	15	1. Analyse the major approaches to research in their chosen area and discuss the importance of ethics within their research area. 2. Demonstrate an understanding of the practical and technical skills required to carry out a specific research project. 3. Demonstrate an ability to plan a specific scientific research project and show sufficient evidence through a research proposal of basic technical and analytical skills to carry it out. 4. Demonstrate a critical awareness of career planning and its relationship to the learning log.	Data and information management Professionalism, values and ethics Data handling Developing and Executing Research Literacy skills Quantitative methods Questioning Commitment to code of ethics Forward thinking Intuition Reflectiveness
Environmental Services and Construction Technology	5	30	1. Justify the design of typical medium rise, high rise and wide span buildings in terms of performance and constructional details to resist the external elements and accommodate their intended purpose. 2. Illustrate both the functions and performance of typical materials and components of buildings, and explain	Construction technology Health and safety Scientific principles related to construction Sustainability IT literate Numeracy skills

			how the site location/soil conditions influence design and construction of the structure. 3. Predict the environmental performance of buildings and their external elements using a number of modelling techniques. 4. Analyse and evaluate the environmental performance of domestic or non-domestic buildings. 5. Apply scientific methods and procedures appropriate to solve problems concerned with the environmental performance of buildings. 6. Select appropriate environmental services to provide for human comfort needs.	
Negotiated Workplace Learning	6	15	1. Demonstrate through work-based evidence how personal/professional knowledge and skills is applied in professional practice. 2. Design a range of skills related to your area of professional practice and for each of them produce knowledge and practice descriptors. 3. Evaluate the impact of theoretical perspectives on workplace practice and demonstrate the influence of WBL on academic perspectives. 4. Critically evaluate own experiential learning by reference to a stated epistemological hierarchy drawing on the learning log.	Built environment Construction technology Health and safety Management Sustainability Communication Decision making Improving ones own performance Inter-personal skills Problem solving Relationships Teamwork Time management Working with others (groups) Communication Decision making Personal effectiveness at work Professional judgement and responsibility Adaptability

				Autonomy Can do approach Common sense Courage Initiative Open-mindedness Positive attitude Presentable Professional Reflectiveness Respect Responsibility Self motivation Sensitivity
Project Evaluation and Development	6	15	1. Consider and evaluate alternative development sites, select and justify appropriate project solutions. 2. Demonstrate knowledge and understanding of the overall development process, including recognising the importance of current methods and trends in the construction of the built environment. 3. Measure the extent to which the project has successfully correlated with the clients defined requirements within current legal, social, economic, technological, environmental and ethical context. 4. Prepare a formal report including an oral presentation upon the project evaluation.	Built environment Construction technology Sustainability Communication Decision making Problem solving Communication
Construction Technology and Innovation	6	15	1. Evaluate current construction issues and practices. 2. Analyse the various forms and methods	Construction technology Sustainability Teamwork

			of special construction. 3. Synthesise and apply innovative construction technology to the design and production of a building. 4. Work as part of a team to carry out a feasibility study and present the findings orally and in writing.	Innovation Creative and imaginative thinking Visionary
Construction Business Strategy	6	15	1. Exhibit an entrepreneurial approach to the Management of a Building Business. 2. Employ a range of skills and knowledge in managing a business in line with objectives set by themselves 3. Analyse and critically appraise business performance as measured against targets set within a business and corporate plan. 4. Analyse existing business performance and create future performance models based upon sound analysis.	Business management Entrepreneurial and business skills (commercial awareness) Financial management Leadership Management Strategic management Analysis Numeracy skills
Project Management	6	15	1. Understand the strategic relevance and operational management of projects. 2. Apply the appropriate techniques for the planning, scheduling and control of projects and the management of change. 3. Recognise the importance of people in teams, developing skills in the leadership, motivation and development of project management teams. 4. Work within a team to research and present relevant information on a course based case study.	Health and safety Management Monitoring and controlling Planning and organising Project management Assimilate, memorise and recall Teamwork Developing people or teams
Environmental Management for the	6	15	1. Consider the implications of recent international, European and national	Built environment Sustainability

Construction Industry			policies for environmental protection on the management of organisations and projects within the construction industry. 2. Analyse the implications of environmental management for a proposed project. 3. Evaluate the relative merits of formal and informal environmental management systems for organisations within the construction industry. 4. Make recommendations for action based on constraints and opportunities.	Analysis Assimilate, memorise and recall Problem solving Implementing sustainable construction and development
Professional Studies	6	15	1. Understand the values and ethics relevant to the built environment professional, and form a critical view on the social, cultural and physical impacts of improvements to practice to further enhance the image and efficiency of the construction industry. 2. Demonstrate a clear understanding of the professional attributes and social consciousness required of the built environment professional, working alone or as part of a larger team. 3. Provide a critical appraisal of performance management systems in the construction industry and how they can benefit both the individual and employer. 4. Identify through a CV and exit plan achievement of technical and professional knowledge, graduate skills, specific career competencies and personal attitudes and attributes appropriate to their chosen profession.	Built environment Professionalism, values and ethics Improving ones own performance Judgements Relationships Commitment to code of ethics Commitment to CPD Professional judgement and responsibility Assertiveness Courage Forward thinking Integrity Open-mindedness Professional Reflectiveness

The Research Project	6	30	1. Demonstrate an understanding of the research process and dissertation structure. 2. Collect, organise, understand and interpret information from a variety of resources, acting autonomously, with minimal supervision. 3. Identify, select and justify the use of appropriate techniques, methods and development strategies, incorporating an ethical dimension where appropriate. 4. Communicate clearly and appropriately, demonstrating a sense of audience 5. Demonstrate a capacity for conceptual, critical and independent thinking. 6. Draw relevant conclusions and identify possible future research as a result of an awareness of the limitations of their research exercise.	Data and information management Professionalism, values and ethics Data handling Developing and Executing Research Literacy skills Quantitative methods Questioning Time management Commitment to code of ethics Managing information Reflectiveness Responsibility Self motivation

Appendix 4 Links between the modules on the BSc (Hons) Construction Management course

Informing modules	Modules	Modules informed
	Personal, Professional and Academic Development	Developing and Executing Research Negotiated Workplace Learning Professional Studies
	Surveying	Building Resource Management
	The Built Environment Work Sector	Negotiated Workplace Learning Environmental Management for the Construction Industry Professional Studies
	Introduction to Civil Law and Legislation	Projects and Contracts Administration
	Construction Economics	Construction Business Strategy
	Site Management and Safety	Building Resource Management Negotiated Workplace Learning
	Introduction to Technology and Design	Building Resource Management Measurement Construction Planning and Programming Analysis and Control of Production Costs Environmental Services and Construction Technology Negotiated Workplace Learning Project Evaluation and Development Construction Technology and Innovation
Site Management and Safety Introduction to Technology and Design	Building Resource Management	Construction Business Strategy Project Management

Introduction to Civil Law and Legislation	Projects and Contracts Administration	
Introduction to Technology and Design	Measurement	
Introduction to Technology and Design	Construction Planning and Programming	Construction Business Strategy
Introduction to Technology and Design	Analysis and Control of Production Costs	Project Evaluation and Development
Personal, Professional and Academic Development	Developing and Executing Research	The Research Project
The Built Environment Work Sector Site Management and Safety Introduction to Technology and Design	Environmental Services and Construction Technology	Negotiated Workplace Learning Project Evaluation and Development Construction Technology and Innovation
Personal, Professional and Academic Development The Built Environment Work Sector Site Management and Safety Introduction to Technology and Design Environmental Services and Construction Technology	Negotiated Workplace Learning	Professional Studies
Introduction to Technology and Design Analysis and Control of Production Costs Environmental Services and Construction Technology	Project Evaluation and Development	
Introduction to Technology and Design Environmental Services and Construction Technology	Construction Technology and Innovation	
Construction Economics Building Resource Management	Construction Business Strategy	Professional Studies

Building Resource Management	Project Management	
The Built Environment Work Sector	Environmental Management for the Construction Industry	
Personal, Professional and Academic Development The Built Environment Work Sector Negotiated Workplace Learning Construction Business Strategy	Professional Studies	
Personal, Professional and Academic Development Developing and Executing Research	The Research Project	

Appendix 5 **Final mapping of the BSc (Hons) Construction Management course to the CIOB Education Framework**

4 years full time placement option

Module	Sustainability	The Construction Environment	Construction Management	Construction Technology	Health, Safety and Welfare	Ethics and Professionalism	Dissertation/ Project
Year 1							
Personal, Professional and Academic Development							
Surveying							
The Built Environment Work Sector							
Introduction to Civil Law and Legislation							
Construction Economics							
Site Management and Safety							
An Introduction to Technology and Design							

Module	Sustainability	The Construction Environment	Construction Management	Construction Technology	Health, Safety and Welfare	Ethics and Professionalism	Dissertation/ Project
Year 2							
Building Resource Management							
Project and Contracts Administration							
Measurement							
Construction Planning and Programming							
Analysis and Control of Production Costs							
Developing and Executing Research							
Environmental Services and Construction Technology							

Module	Sustainability	The Construction Environment	Construction Management	Construction Technology	Health, Safety and Welfare	Ethics and Professionalism	Dissertation/ Project
Year 3							
Negotiated Workplace Learning							
Year 4							
Project Evaluation and Development							
Construction Technology and Innovation							
Construction Business Strategy							
Project Management							
Environmental Management for the Construction Industry							
Professional Studies							
The Research Project							

5 year part time option

Module	Sustainability	The Construction Environment	Construction Management	Construction Technology	Health, Safety and Welfare	Ethics and Professionalism	Dissertation/ Project
Year 1							
Personal, Professional and Academic Development							
Surveying							
An Introduction to Technology and Design							
Year 2							
The Built Environment Work Sector							
Introduction to Civil Law and Legislation							
Construction Economics							
Site Management and Safety							

Module	Sustainability	The Construction Environment	Construction Management	Construction Technology	Health, Safety and Welfare	Ethics and Professionalism	Dissertation/ Project
Year 3							
Building Resource Management							
Construction Planning and Programming							
Analysis and Control of Production Costs							
Environmental Services and Construction Technology							
Year 4							
Project and Contracts Administration							
Measurement							
Developing and Executing Research							
Negotiated Workplace Learning							
Environmental Management for the Construction Industry							

Module	Sustainability	The Construction Environment	Construction Management	Construction Technology	Health, Safety and Welfare	Ethics and Professionalism	Dissertation/ Project
Year 5							
Construction Technology and Innovation							
Construction Business Strategy							
Project Management							
Professional Studies							
The Research Project							

Appendix 6 Yearly Review Template (based on ideas from Mark Tree, Anglia Ruskin University)

Year …… Semester ……			
Module	**Knowledge gained**	**Skills developed**	**Module reflection**
	• • • •	• • • •	
	• • • •	• • • •	
	• • • •	• • • •	
Development needs			
Development actions			
Template sign off			Date:

Year …… reflection

Overall course reflection